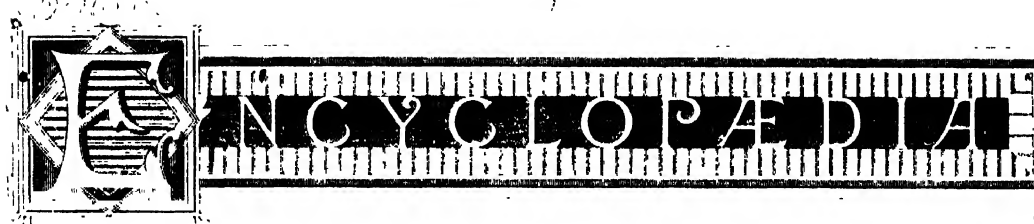


IN HIGH LATITUDES



INTERNATIONAL



A DICTIONARY OF UNIVERSAL KNOWLEDGE

By

WRITERS OF EMINENCE IN

LITERATURE, SCIENCE, AND ART

VOLUME II.

LONDON,

WILLIAM MACKENZIE, 69 LUDGATE HILL, E C

EDINBURGH, AND GLASGOW

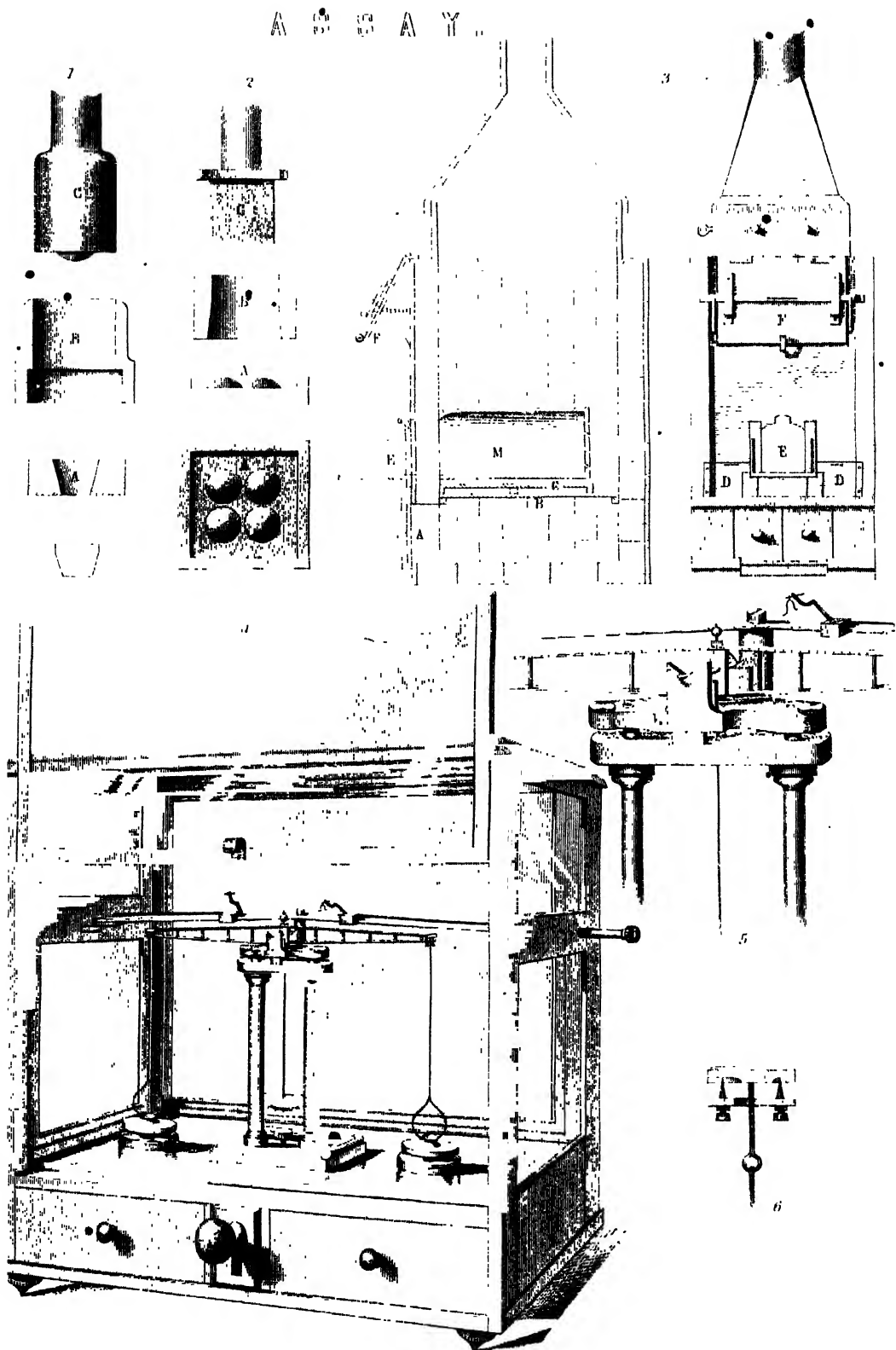
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temples in an
 general arrangement
 of the city
 of Athens
 of the city
 of Athens

Temple of
 Athena
 on the Acropolis
 of Athens

Temple of
 Apollo
 on the Acropolis
 of Athens

Temple of
 Mars
 on the Acropolis
 of Athens

Temple of
 Jupiter
 on the Acropolis
 of Athens

Temple of
 Minerva
 on the Acropolis
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Temple of
 Venus
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Temple of
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Temple of
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Temple of
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Temple of
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Temple of
 Apollo
 on the Acropolis
 of Athens

Temple of
 Jupiter
 on the Acropolis
 of Athens

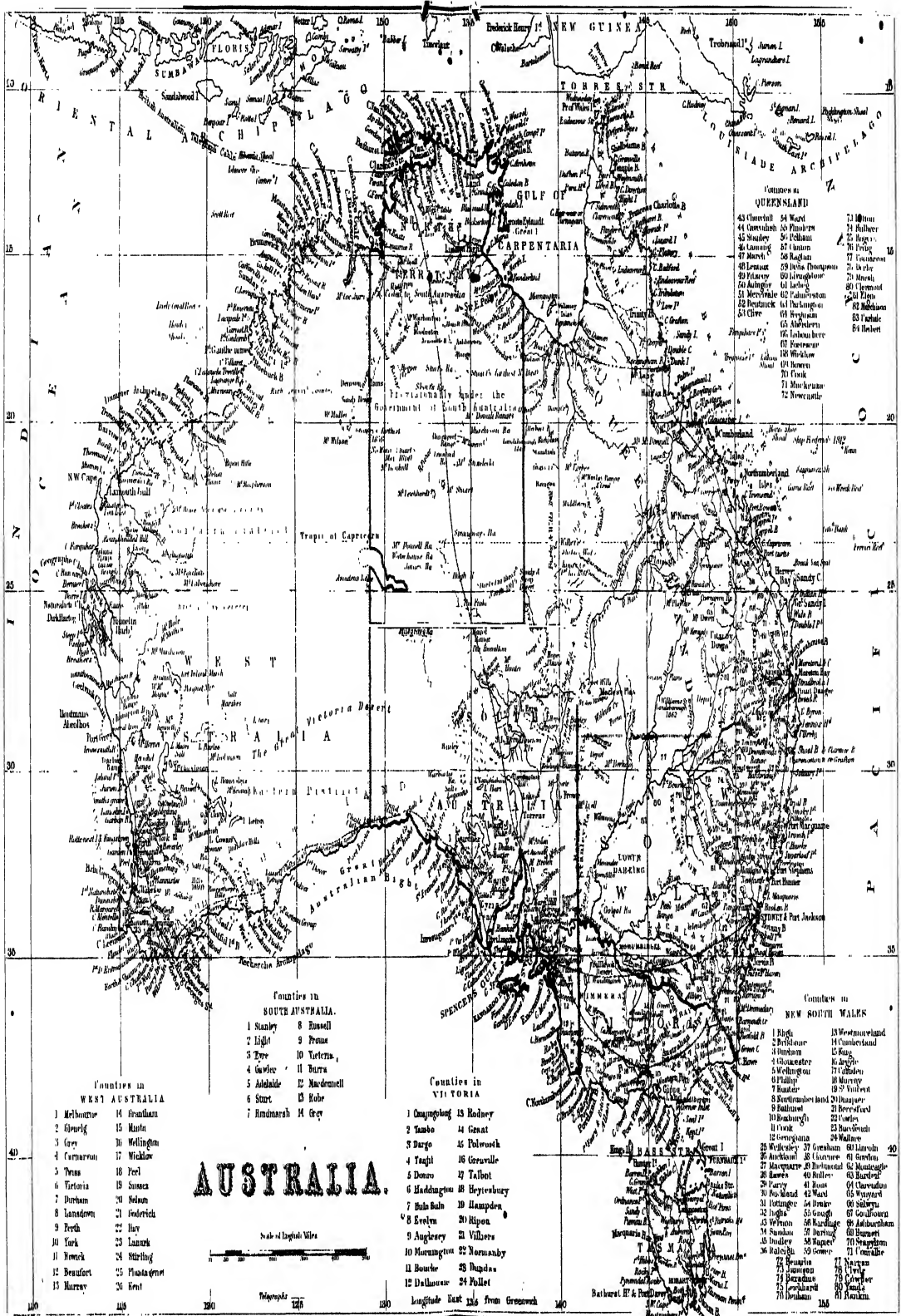
Temple of
 Minerva
 on the Acropolis
 of Athens

Temple of
 Venus
 on the Acropolis
 of Athens

Temple of
 Mars
 on the Acropolis
 of Athens



Temple of
 Mars
 on the Acropolis
 of Athens



Counties in
SOUTH AUSTRALIA.

- | | |
|-------------|---------------|
| 1 Stanley | 8 Russell |
| 2 Light | 9 Pringle |
| 3 Zee | 10 Victoria |
| 4 Gawler | 11 Burra |
| 5 Adelaide | 12 Mardianell |
| 6 Sturt | 13 Kober |
| 7 Hindmarsh | 14 Grey |

Counties in
WEST AUSTRALIA

- | | |
|-------------|---------------|
| 1 Melbourne | 14 Broadman |
| 2 Haverly | 15 Minto |
| 3 Grey | 16 Wellington |
| 4 Carnarvon | 17 Wickham |
| 5 Perth | 18 Peel |
| 6 Victoria | 19 Sussex |
| 7 Durban | 20 Nelson |
| 8 Landdown | 21 Frederick |
| 9 Perth | 22 Bay |
| 10 York | 23 Lancelark |
| 11 York | 24 Stirling |
| 12 Bradford | 25 Hamilton |
| 13 Murray | 26 Kent |

Counties in
VICTORIA

- | | |
|---------------|--------------|
| 1 Otagoville | 15 Rodney |
| 2 Tamba | 16 Genat |
| 3 Dargo | 17 Polworth |
| 4 Tait | 18 Gravelle |
| 5 Dromo | 19 Talbot |
| 6 Haddington | 20 Hyresbury |
| 7 Bul Bul | 21 Hampden |
| 8 Evelyn | 22 Ripon |
| 9 Anglesey | 23 Villiers |
| 10 Norwington | 24 Normanby |
| 11 Bourke | 25 Rudasia |
| 12 Dalhousie | 26 Pollard |

Counties in
NEW SOUTH WALES

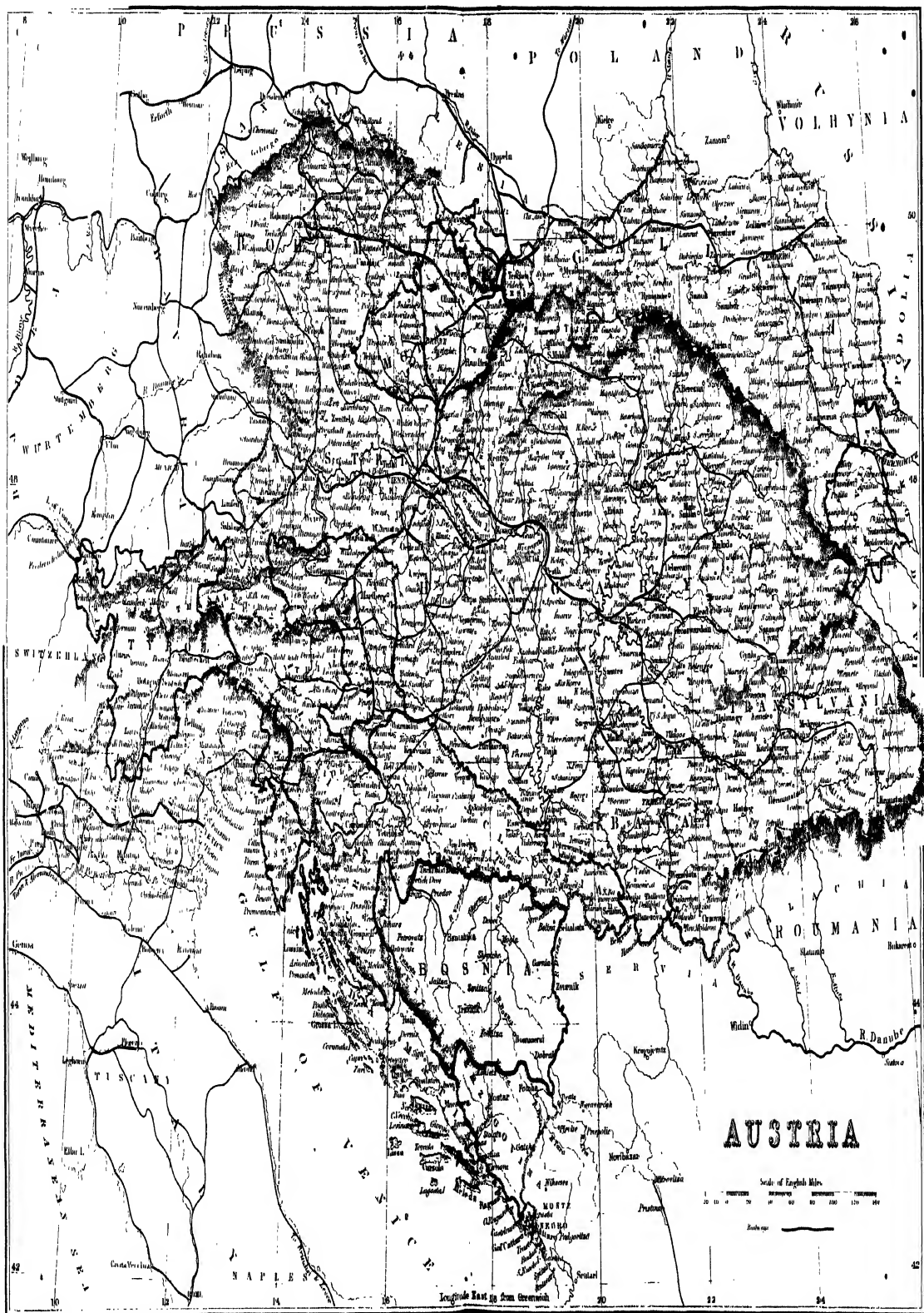
- | | |
|----------------|-----------------|
| 1 Bligh | 13 Westmoreland |
| 2 Bribair | 14 Underland |
| 3 Durham | 15 King |
| 4 Gloucester | 16 Argyle |
| 5 Wellington | 17 Camden |
| 6 Phillip | 18 Murray |
| 7 Hunter | 19 St Vincent |
| 8 Berwickshire | 20 Denbury |
| 9 Ballwin | 21 Bedford |
| 10 Beaufort | 22 Camden |
| 11 Frank | 23 Macleod |
| 12 Gungahlin | 24 Walpole |
| 13 Wollsway | 25 Gresham |
| 14 Macleod | 26 Lorne |
| 15 Macleod | 27 Macleod |
| 16 Macleod | 28 Macleod |
| 17 Macleod | 29 Macleod |
| 18 Macleod | 30 Macleod |
| 19 Macleod | 31 Macleod |
| 20 Macleod | 32 Macleod |
| 21 Macleod | 33 Macleod |
| 22 Macleod | 34 Macleod |
| 23 Macleod | 35 Macleod |
| 24 Macleod | 36 Macleod |
| 25 Macleod | 37 Macleod |
| 26 Macleod | 38 Macleod |
| 27 Macleod | 39 Macleod |
| 28 Macleod | 40 Macleod |
| 29 Macleod | 41 Macleod |
| 30 Macleod | 42 Macleod |
| 31 Macleod | 43 Macleod |
| 32 Macleod | 44 Macleod |
| 33 Macleod | 45 Macleod |
| 34 Macleod | 46 Macleod |
| 35 Macleod | 47 Macleod |
| 36 Macleod | 48 Macleod |
| 37 Macleod | 49 Macleod |
| 38 Macleod | 50 Macleod |

AUSTRALIA.

Scale of English Miles



Longitude East 124 from Greenwich



AUTOGRAPHS.

PLATE 7.

OF THE 14TH, 15TH, & 16TH CENTURIES.

No. 1.

*Ceste Bible est
pour Charles
le 5^e de France
pour de France
est le 5^e de France
et la fin de France
et de France*

No. 3.

Ennon

No. 2.

Agnes Sorel

No. 2. Signature of
Agnes Sorel.
Date, April 13, 1442.

Charles

disade no si punda

No. 3. Letter from Christopher Columbus .
to the Viceroy of Castile.
1441 to 1515.

age no postum omnium

No. 6. Letter of Erasmus. 1476 to 1536.

No. 4.

monje mon boy frere

No. 1. Written by Charles V. of France
in a folio Bible now in the Biblio-
theque Nationale, Paris. Died 1380.

No. 4. Anne of Brittany. Died 1514.

Monje mon boy frere

No. 7.

trigulari equa audistis progreque plet

No. 8. Letter of Copernicus. 1473 to 1543.

Charles V

No. 7. Letter from the Emperor
Charles V. to Francis I.

No. 9.

just co 22 Zanderbar 1559

No. 9. Letter of Calvin.
Dated 1559.

Calvin

No. 11.

Bayard

No. 5. Signature of Bayard, the Chevalier
"Sans peur et sans reproche."

*Assembly of France
Joy to further*

No. 11. Letter of the Earl of Essex.
1567 to 1601.

No. 10.

affictio 10. 12. 1603

No. 10. Letter of Queen Elizabeth to Henry IV. of France.
1533 to 1603.

No. 1.

Sum hac senbo Amphus una

No. 1. Camden. Dated
12th Jan., 1619.

No. 2.

Shooloush, luvrtvtafle

No. 2. Anne of Austria,
Dated 27th Feb., 1638.

No. 3.

I cannot refuse this

No. 3. Charles I. to his sister
the Princess Palatine.
No date.

No. 4.

made and espoused the Sumptuous

No. 4. Oliver Cromwell.
Written in 1643 to
the Rev. H. Hick
(From Congreve Collection).

No. 5.

Vosre approbation

No. 5. Christina of Sweden.
1626 to 1689.

No. 6.

vous estes pour moy

No. 6. Madame de Sevigné.
1623 to 1626. Dated
Angers, 25th Sept.

No. 7.

Je voudrois bien vous paier marder

No. 7. Letter from Boileau
to Racine. Dated
May 19th, 1687.

No. 8.

Thüler b. l. l. l. l.

No. 8. Letter of Charles XII.
of Sweden.

No. 1.

Happy success in this

No. 1. Marlborough. Dated
Rousselaer, June 15, 1706.

No. 2.

same time to let me know what

No. 2. Addison. Dated
April 25, 1710.

No. 3.

ayez l'abonte de puffer

No. 3. Lord Bolingbroke to the
Abbé Dubois. Dated
Thursday, 2 o'clock.

No. 4.

J'attends avec une réponse
Buffon

No. 4. Buffon. Dated Jan. 23, 1730.

No. 5.

with him, from Twickenham & Sept

No. 5. Pope to J. Brinsden, Esq.
No date.

No. 6.

ne rentrez pas sans l'ame aussi

No. 6. Rousseau, Dated
L'Ermitage, 14th Nov. 1757.

No. 7.

quitter je vous en prie le moins

No. 7. Voltaire. Dated
July 29, 1757.

No. 8.

J'ai bien vu

No. 8. The Empress Catherine II.
of Russia. Dated 23rd July.

No. 9.

well affected to the

No. 9. Washington. Dated 6th Sept.

No. 10.

notre amour pour la bien-publique

No. 10. Louis XVI. Dated
Versailles, June 30, 1775.

No. 11.

mon vray La volonté de protéger les citoyens

No. 11. Robespierre. Dated 13 Floreal,
2nd year of the Republic.

OF THE 18TH & BEGINNING OF 19TH CENTURY

No. 1.

You have an armed Tyranny to deal with, &

No. 2.

No. 1. Edmund Burke.

No views can render picture

No. 2. The Poet Alfieri.
Dated Dec. 28, 1782.

No. 3.

Dunque spero che tutto

No. 3. Count Cagliostro,
Dated Feb. 4.

I conclude from your letter

No. 4.

No. 4. William Pitt,
Dated Walmer Castle,
March 27, 1803.

No. 5. Sir J. Banks. Dated
Soho Square, Jan. 26,
1802.

No. 5.

I beg you to ac.

To get the enclosed

No. 6.

No. 6. Richard Brinsley
Sheridan. Dated
March 29, 1808.

No. 7. Napoleon Bonaparte as first
Consul—addressed to Soult
when in command of the
army collected at Boulogne
for the invasion of England.

No. 7.

*Unangkas outbrewhull, sawit la
ladwiran dabaprawarun oy an
aBoud la 2 Lpigo amenge a luge*

Yours truly yours

No. 8.

No. 8. The Prince Eugène Beauharnais.
Dated March 13, 1813.

They are very civil

No. 9.

*"I ain"—but larin
at its tendency as they*

No. 9. Lord Byron. Dated
Pisa, Nov. 4, 1821.

No. 10.

He.

No. 10. Signature of W. H. Prescott,
the Historian of Mexico.

No. 11.

ington Irving

No. 11. Signature of Washington Irving

No. 12.

Macaulay

No. 12. Signature of
Lord Macaulay.

1850-1851

Alfred Howard.

Napoleon

Welling

Chief M. H.

W. H. H. (1811)

W. H. H.

Beaconsfield

W. H. H.

Reuben

John Bright

W. H. H.

Ralph W. Whitwell

Henry W. Longfellow

J. Mayson

W. H. H.

W. H. H.

T. Carlyle

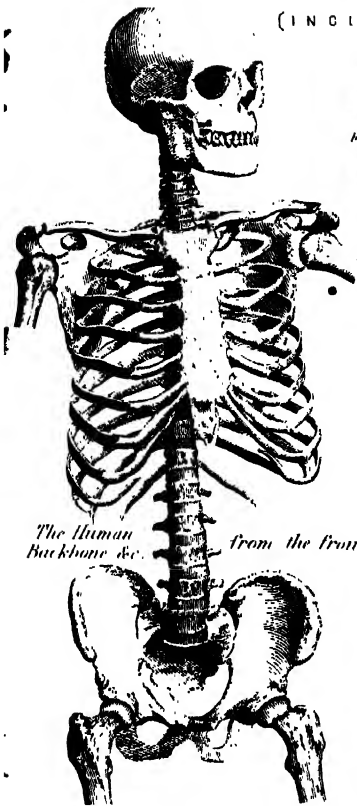
W. H. H.

W. H. H.

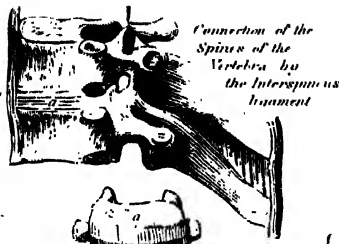
BACKBONE.

PLATE I.

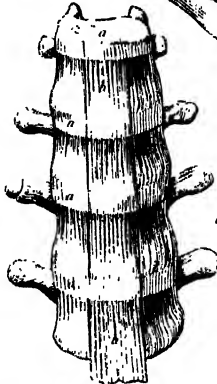
(INCLUDING RIBS AND PELVIS)



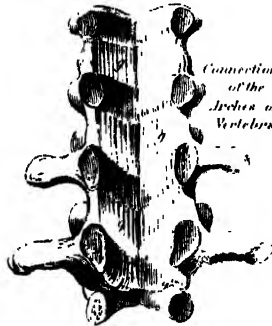
The Human Backbone &c. from the front.



Connection of the Spinous of the Vertebra by the Interspinous Ligament

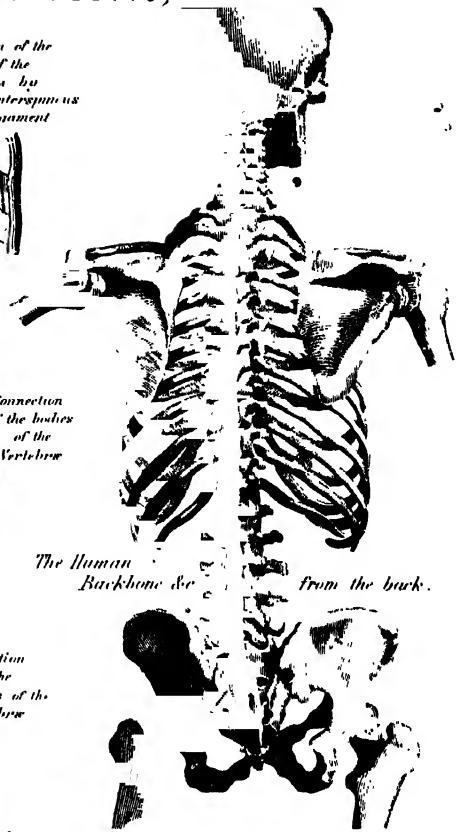


Connection of the bodies of the Vertebrae

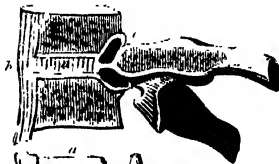


Connection of the Arches of the Vertebrae

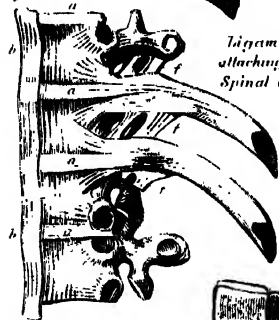
Backbone joints.



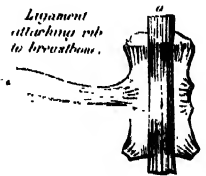
The Human Backbone &c. from the back.



Ligaments attaching Ribs to Spinal column.



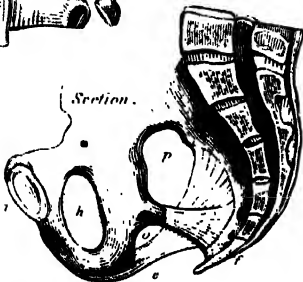
Rib joints.



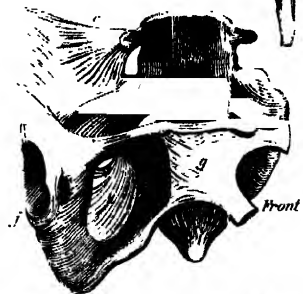
Ligament attaching rib to hyaline cartilage.



Joint of rib with Vertebra.



Section.



Front.



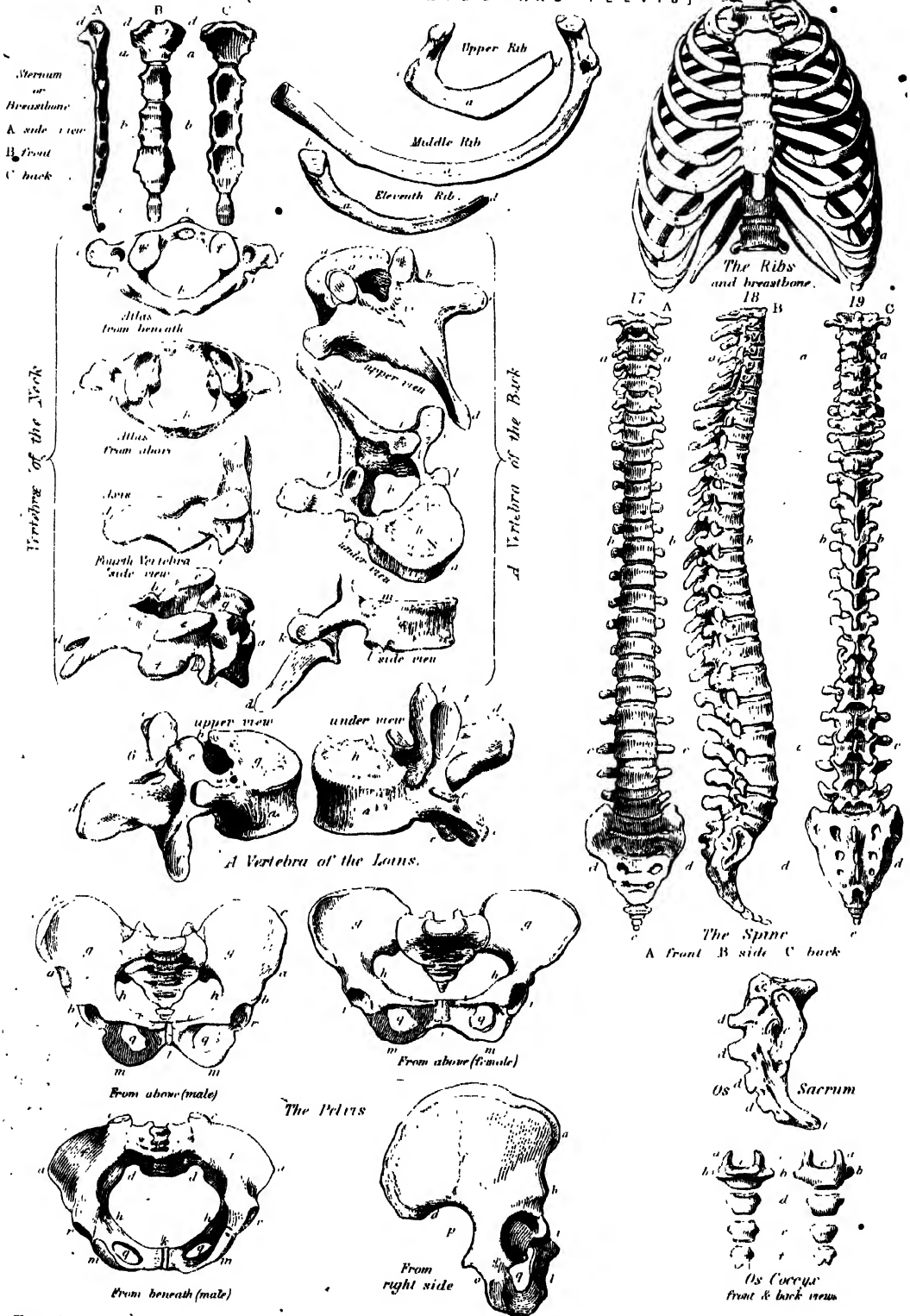
Back.

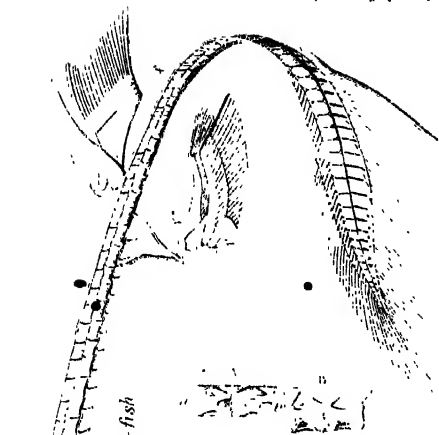
Principal ligaments of the Pelvis.

B A C K B O N E .

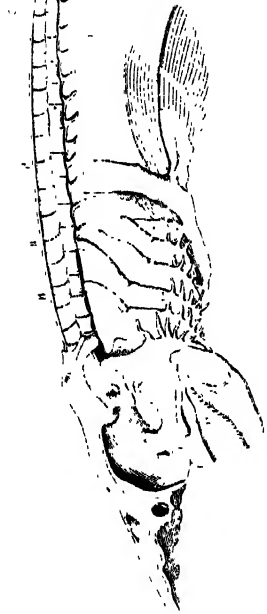
PLATE 2.

(INCLUDING RIBS AND PELVIS)

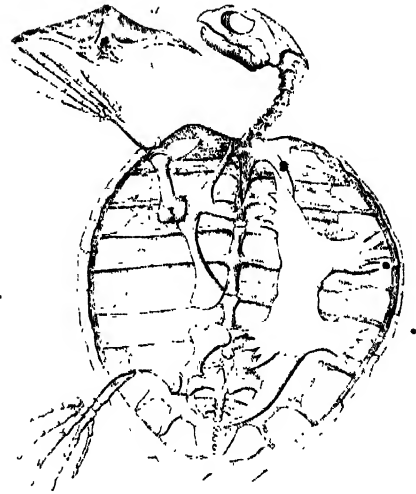




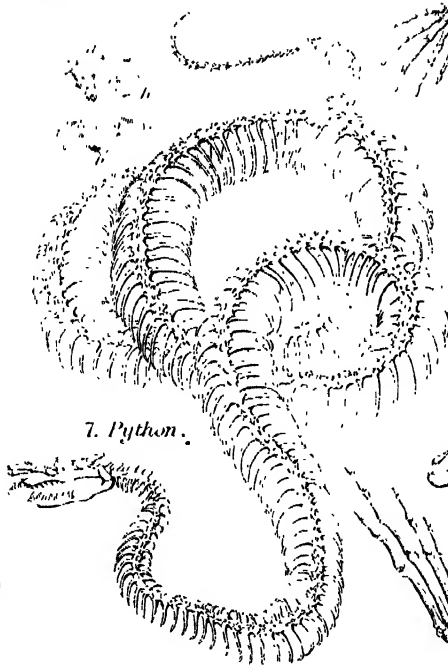
3. Spiny Dog fish



1. Sandpiper



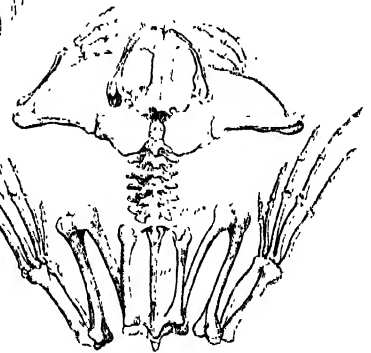
6. Tortoise.



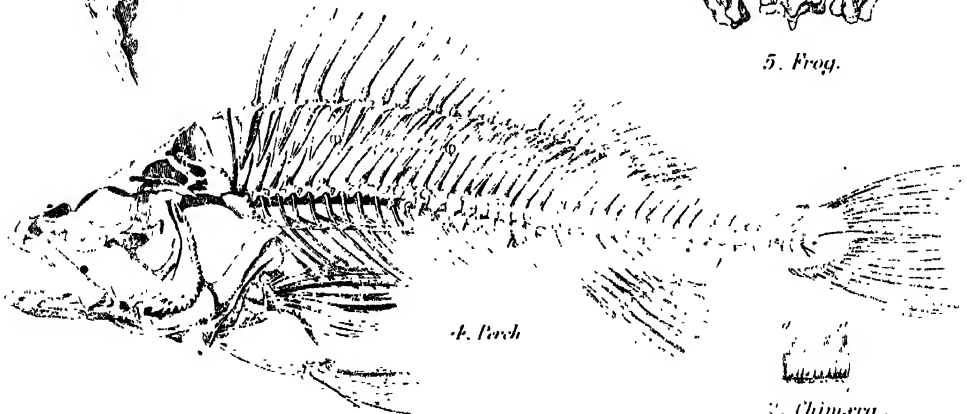
7. Python.

8. Triton.

9. Proteus.

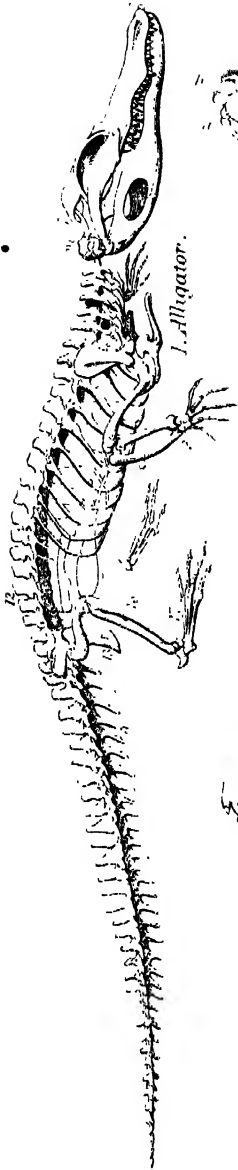


5. Frog.



4. Parrot

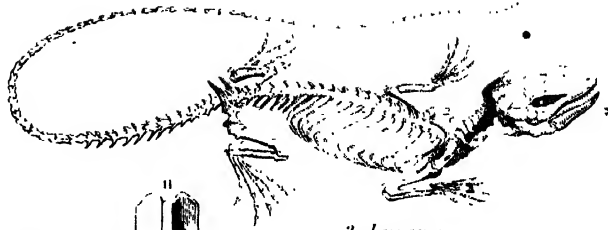
2. Chimera.



1. Alligator.



2. Crocodile.



3. Iguana.

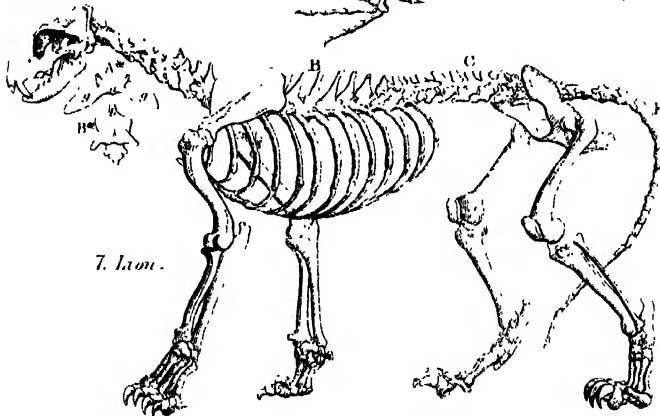


4. Common Fowl



5. Woodpecker.

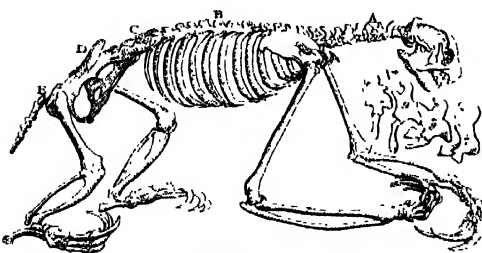
6. Peacock



7. Lion.



8. Dugong.

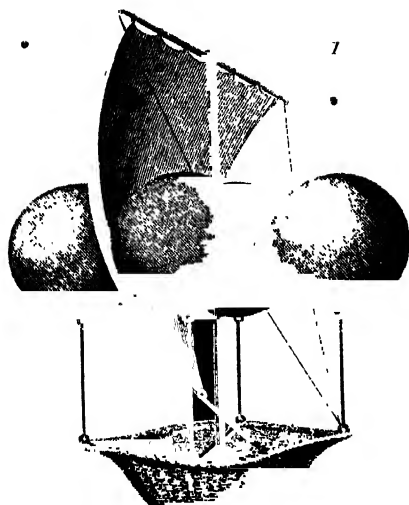


9 Three toed Sloth.



10 Mole.

Laun's Aeronautic Machine.

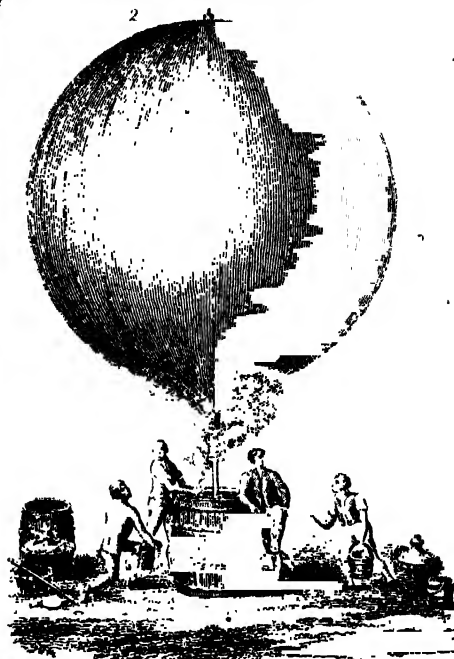


1

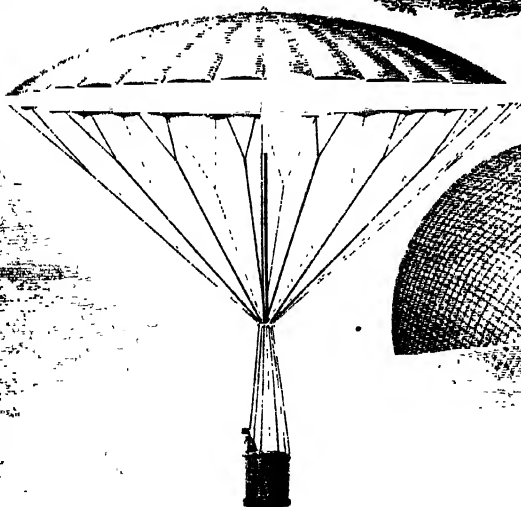


Charles & Roberts' Balloon.

2

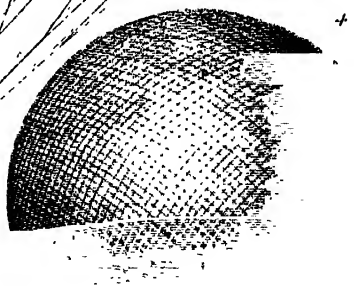


Montgolfiers Balloon



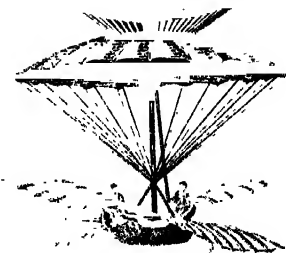
Blanchards Balloon

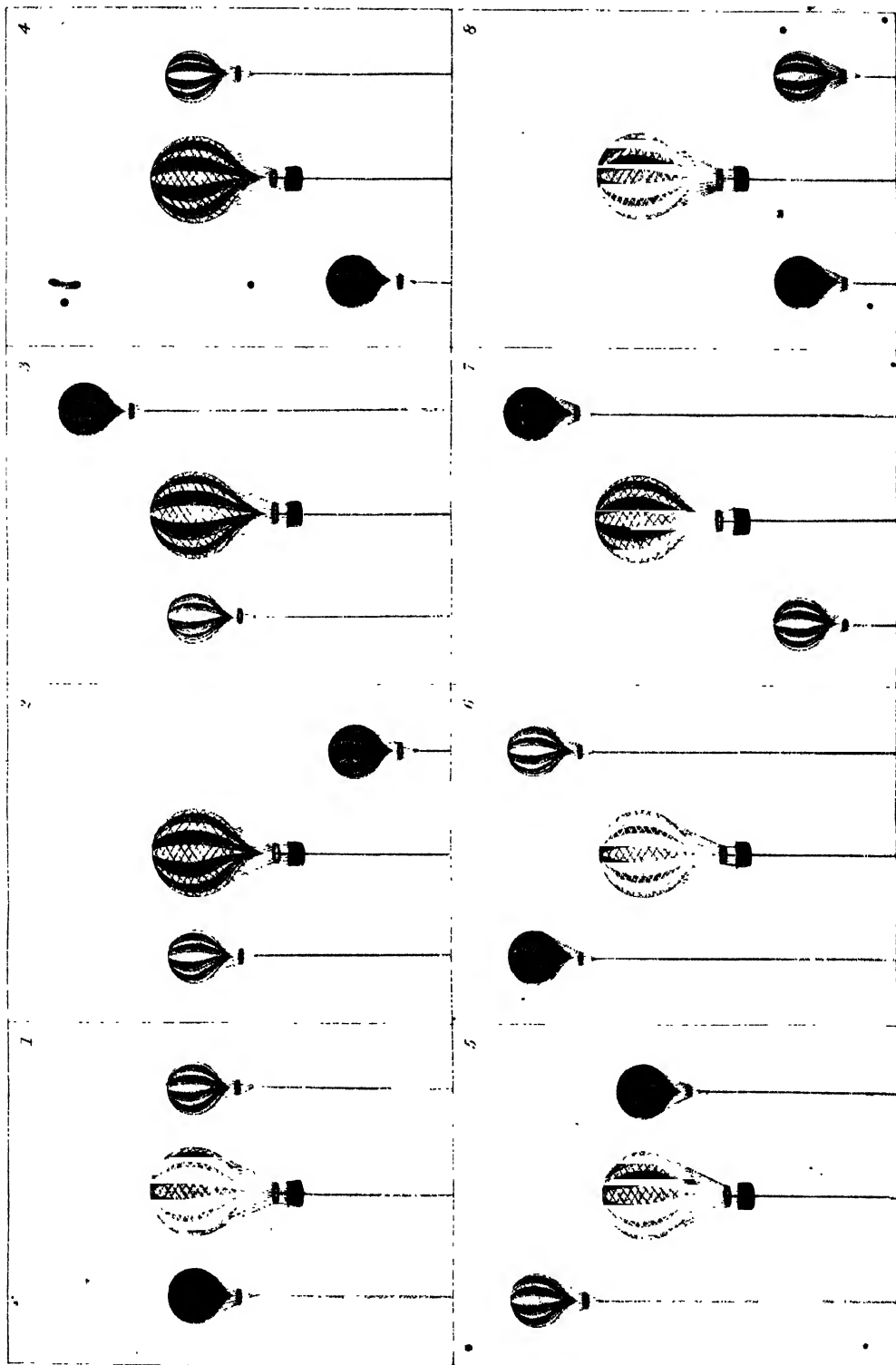
4



5 Parachute closed

6 Parachute open.

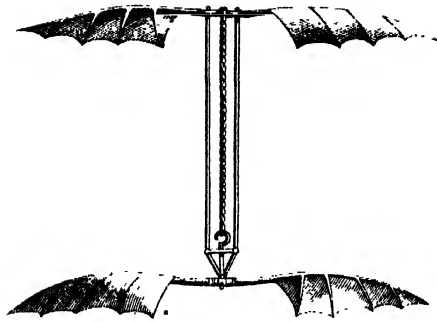




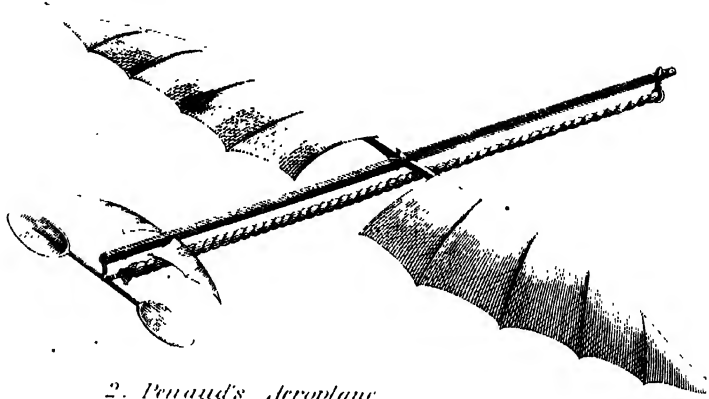
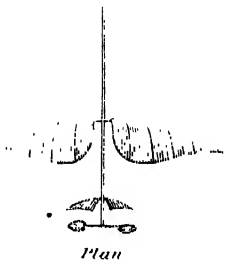
BALLOONS.

(AERONAUTICAL MACHINES)

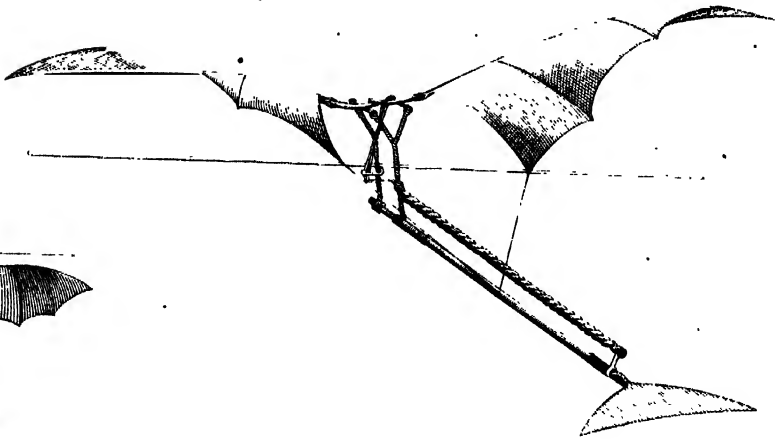
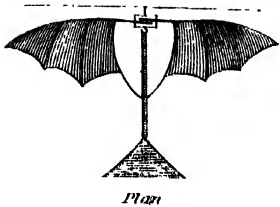
PLATE .



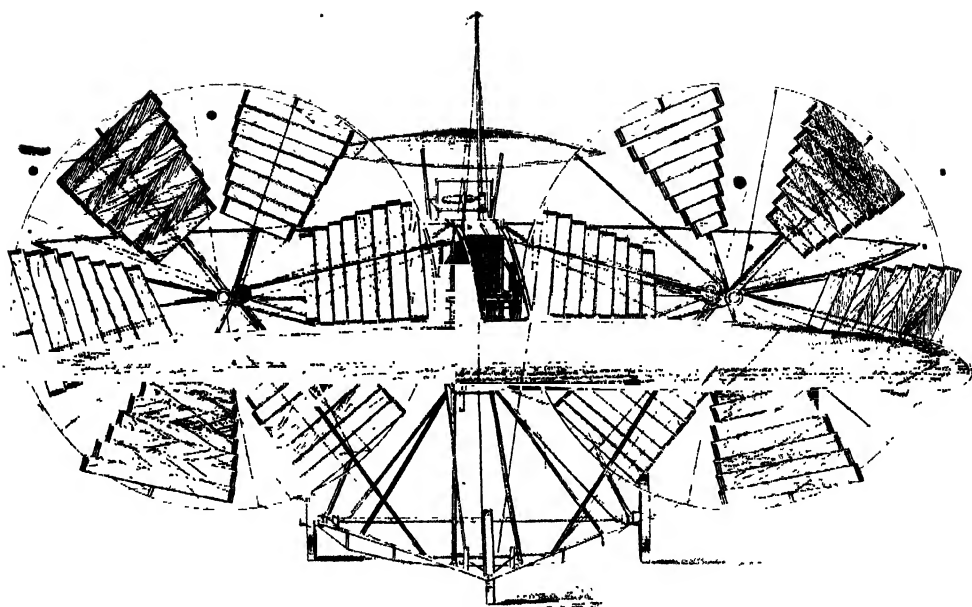
1. *Penaud's Helicopter.*



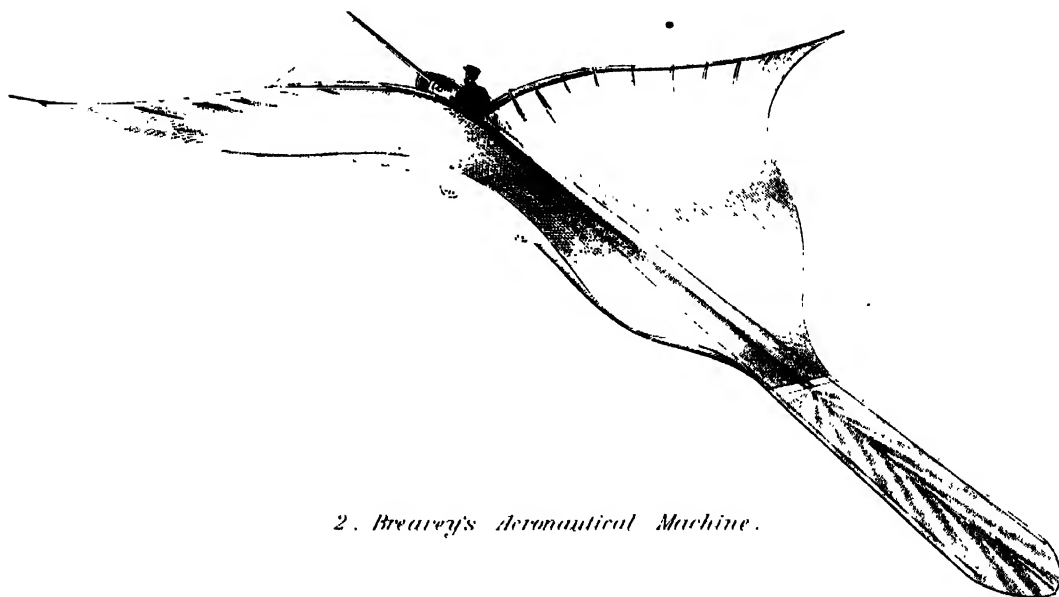
2. *Penaud's Aeroplane*



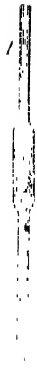
3. *Penaud's Mechanical Bird.*



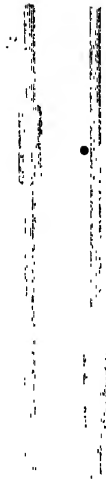
1. Moys's Aerial Steamer.



2. Breavey's Aeronautical Machine.



1.
Pascal's
barometer.



2.
Torricelli's
barometer.

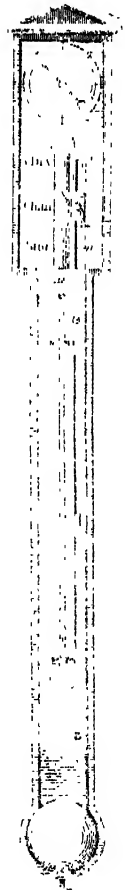


3.
Hook's
barometer.



4.
Bernoulli's barometer.

5.



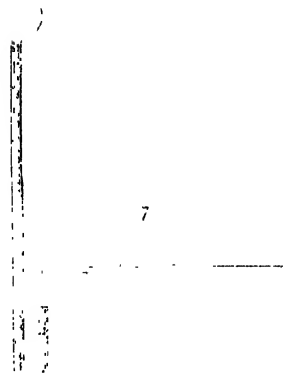
5.
Chamber's barometer.



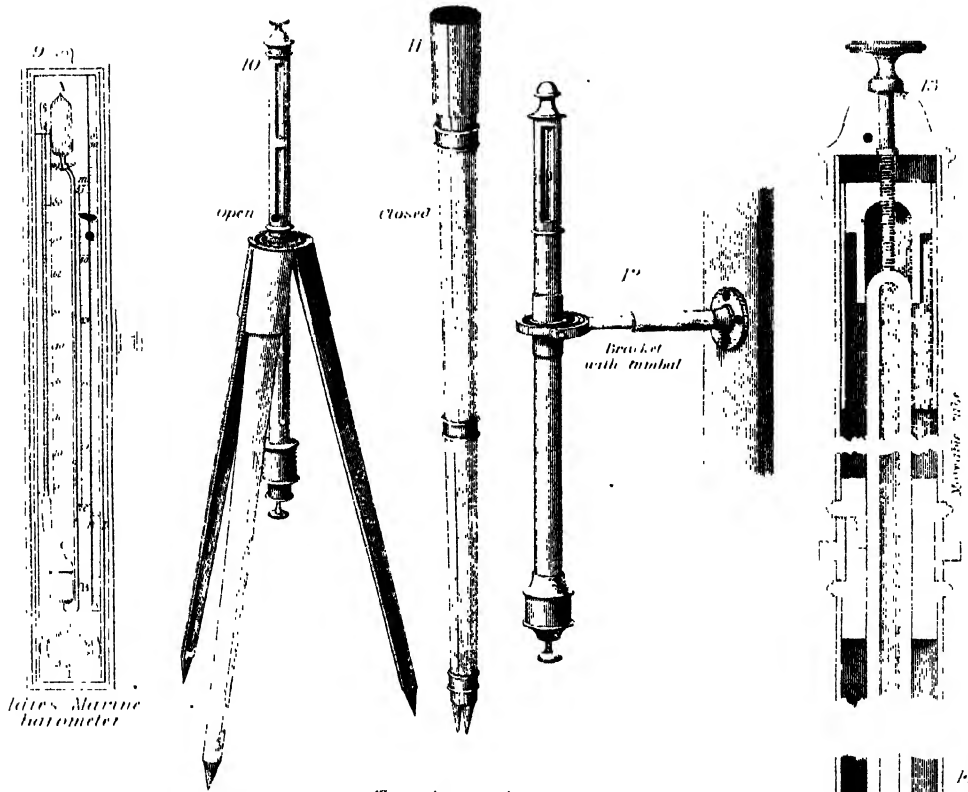
6.
Morland's
barometer.



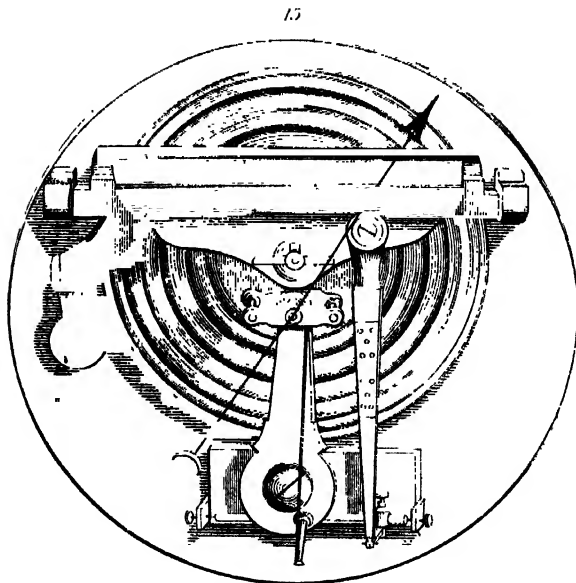
7.
Float's barometer.



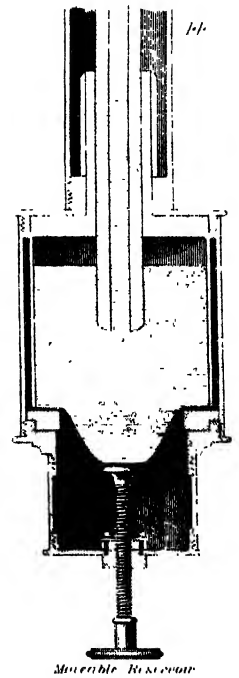
8.
Pascal's
barometer.



Troughton's barometers



Aneroid Barometer

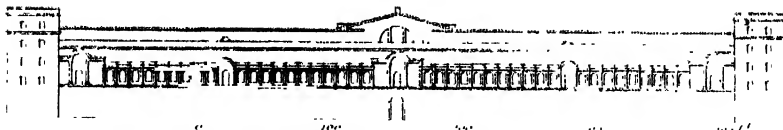


Movable Barometer

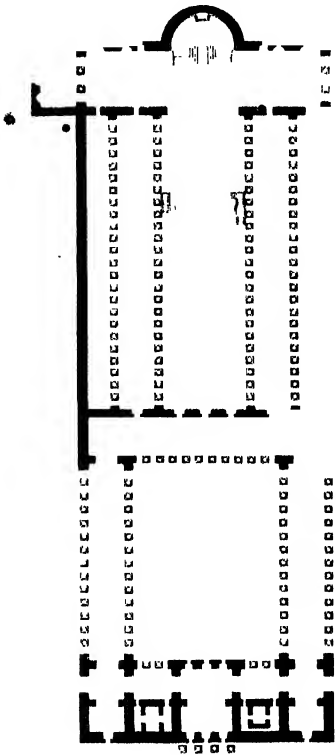


RAJASTHAN STATE GOVT.

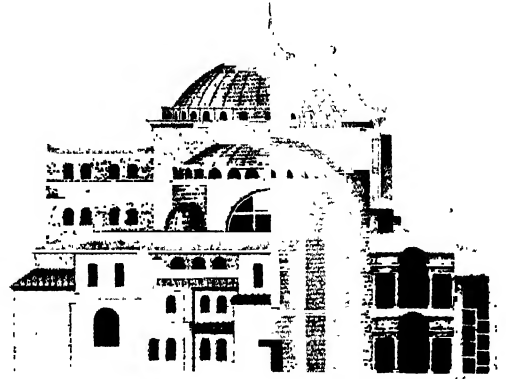
BASILICA, & BYZANTINE ARCHITECTURE



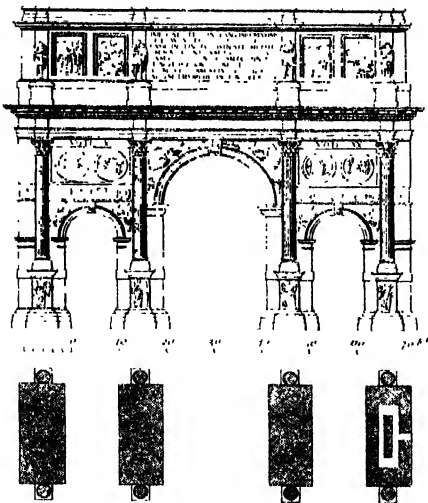
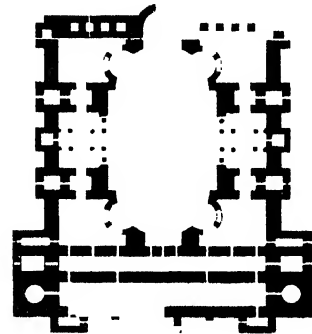
Elevation of the South front of Diocletian's Palace at Spalatro



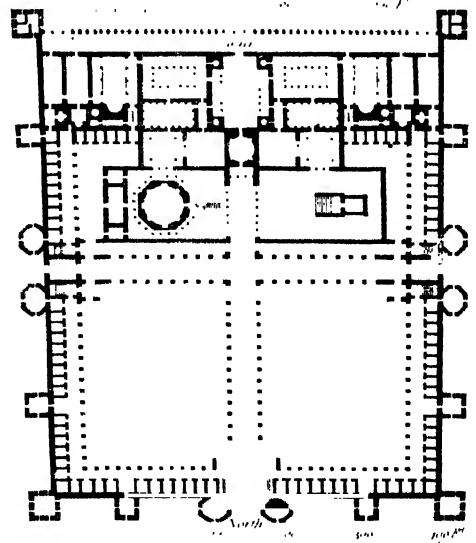
Plan of the ancient Basilica of St. Peter at Rome



Elevation and Plan of the Cathedral of St. Sophia at Constantinople



Elevation and Plan of the triumphal Arch of Constantin



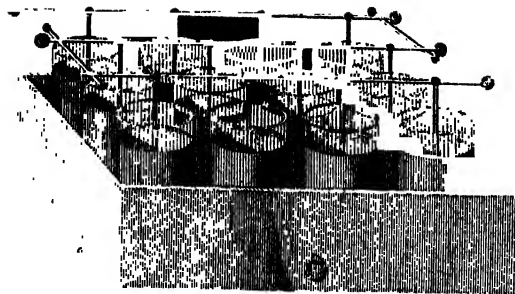
Plan of Diocletian's Palace at Spalatro

(CHIROPTERA)

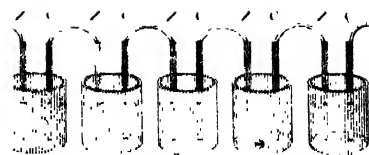


Phyllostoma sp. triqui *Phyllostoma Bat*

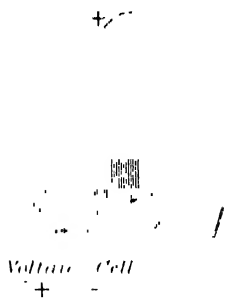
Pteropus indus *Indus Bat*



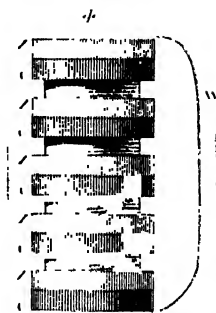
Electric Battery



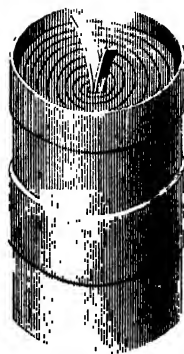
Voltaic Battery



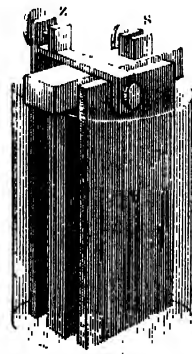
Voltaic Cell



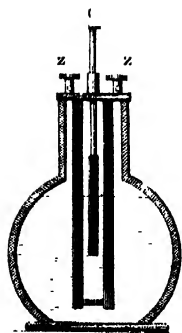
Voltaic Pile



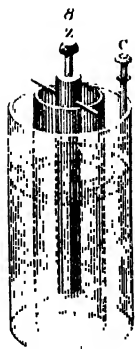
Faure's accumulator



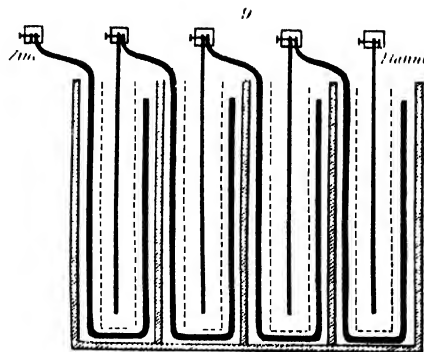
Storer's battery.



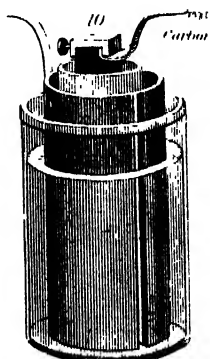
Bichromate battery.



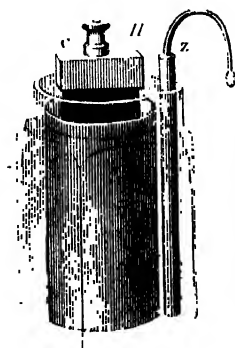
Daniell's battery.



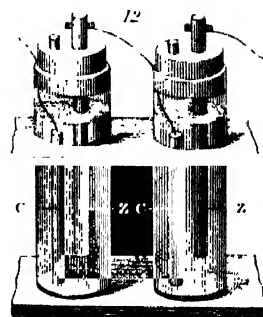
Grove's battery.



Bunsen's battery.



Leclanché battery.



De la Rue's Chloride of Silver battery



Edward's instructions to Harold.



Harold's Oath of Fealty to William of Normandy.



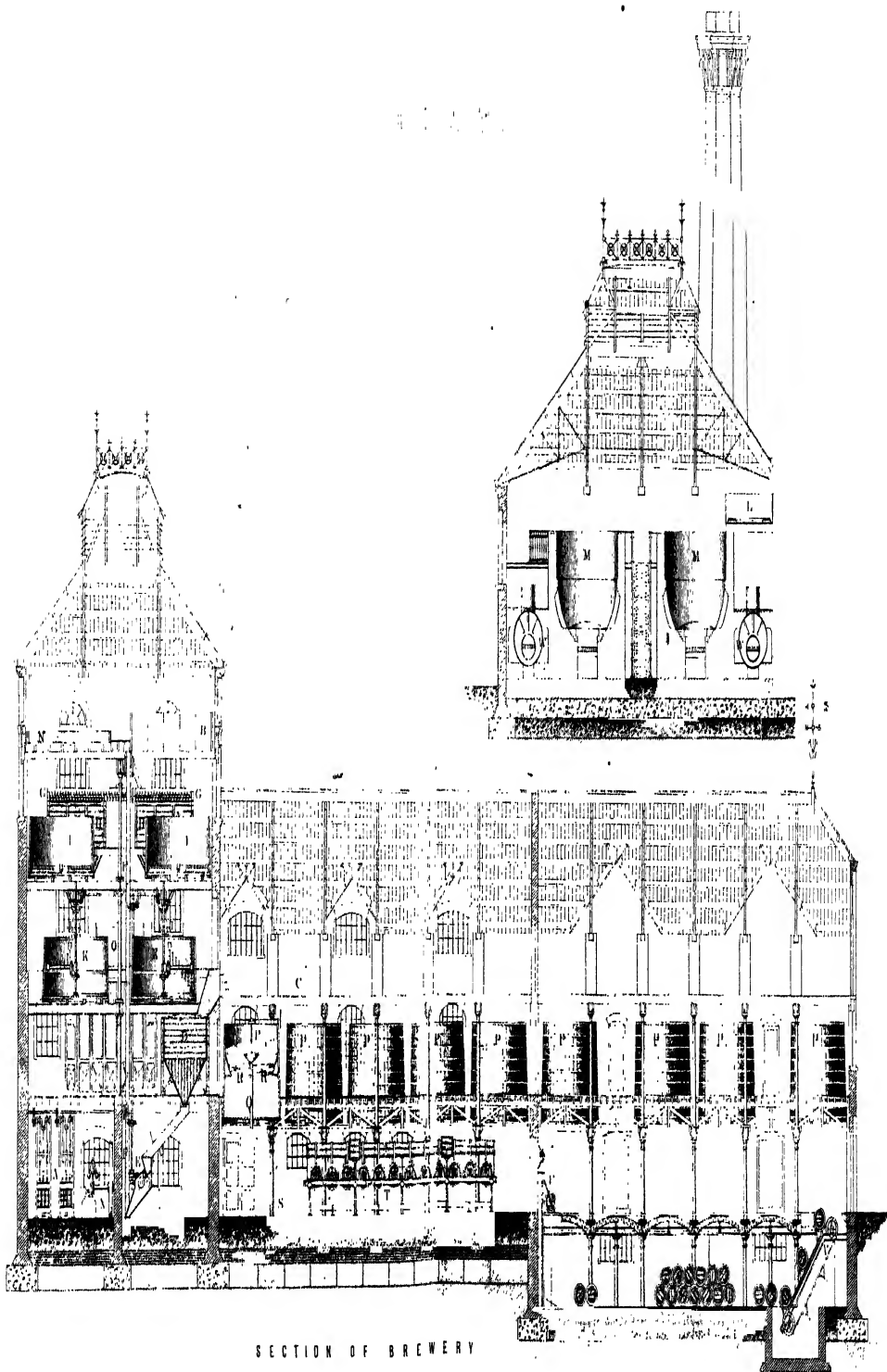
Harold's Coronation.



Battle of Hastings & Death of Harold.



Ursus Martimus Polar Bear.



SECTION OF BREWERY

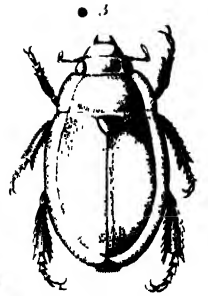
*Pumps B Cold Lager Cask C Malt Store D Malt Hopper E Malt Rolls F Elevator G Malt Screws H Grist Cases I Hot Lager Barrels J Stair's Mashing Machines K Mash Tuns L Under Back M Wort Coppers N Cools
 Refrigerator P Fermenting Tuns Q Skimming Apparatus R Attenuator S Tun Room T Union Chasing Casks U Cask Lowering Machine V Cask Raising Machine W Steam Boilers X Steam Engine.*



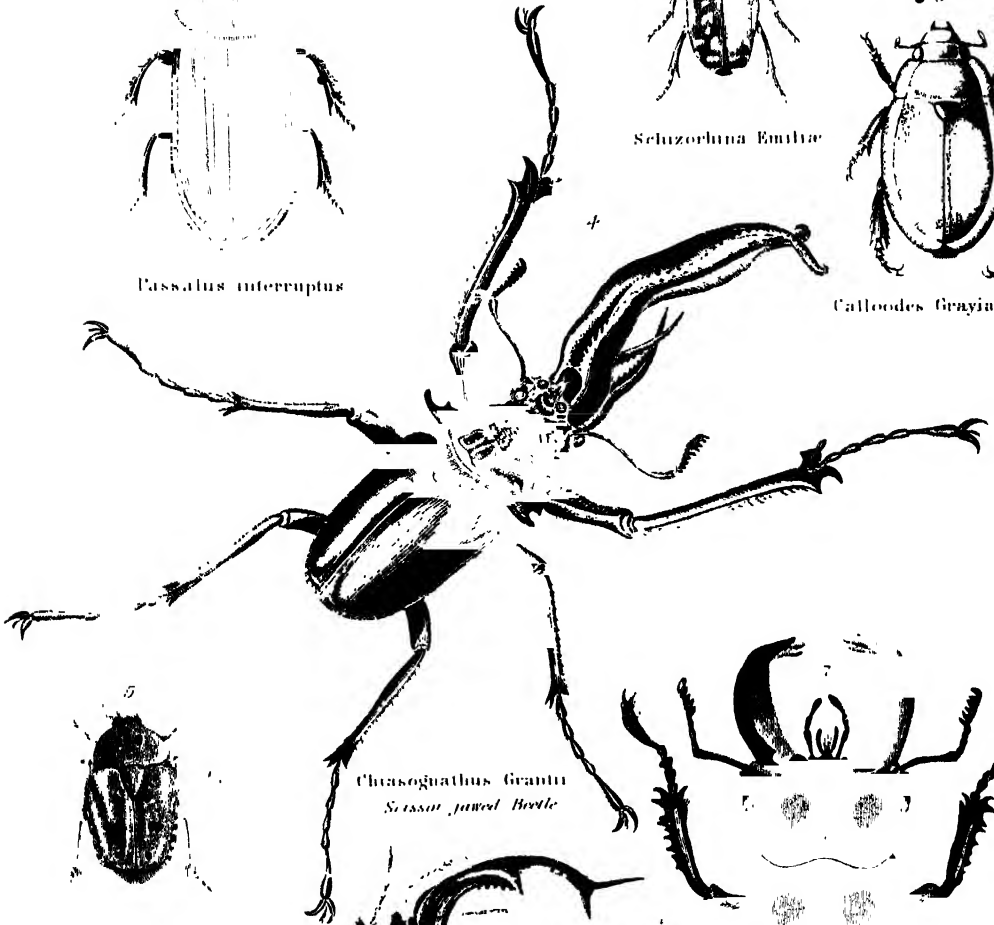
Passalus interruptus



Schizorhina Emilia



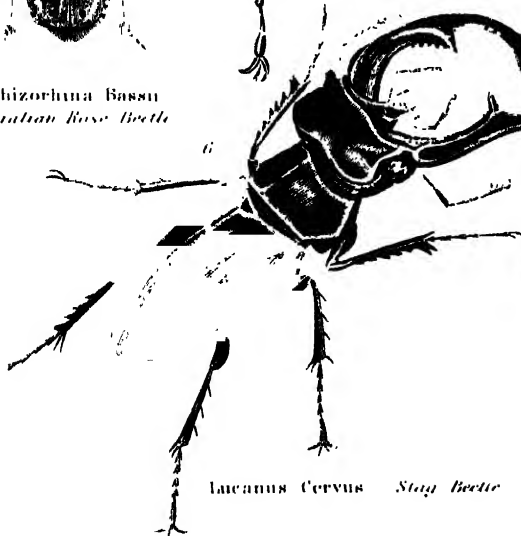
Calloodes Grayanus



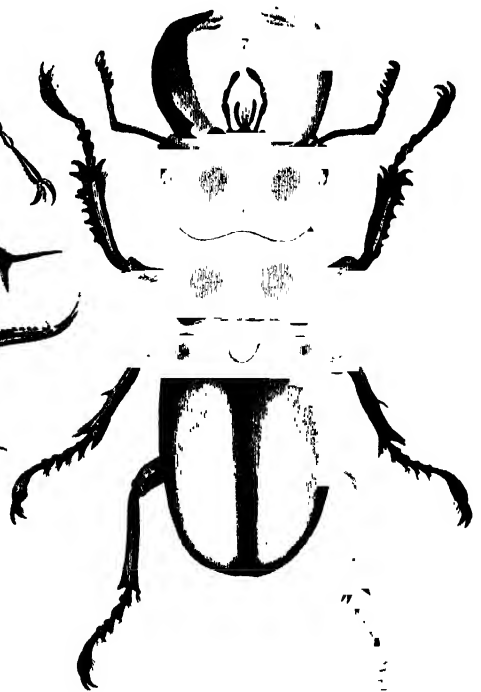
Chasmodon Grantii
Scissor-jawed Beetle



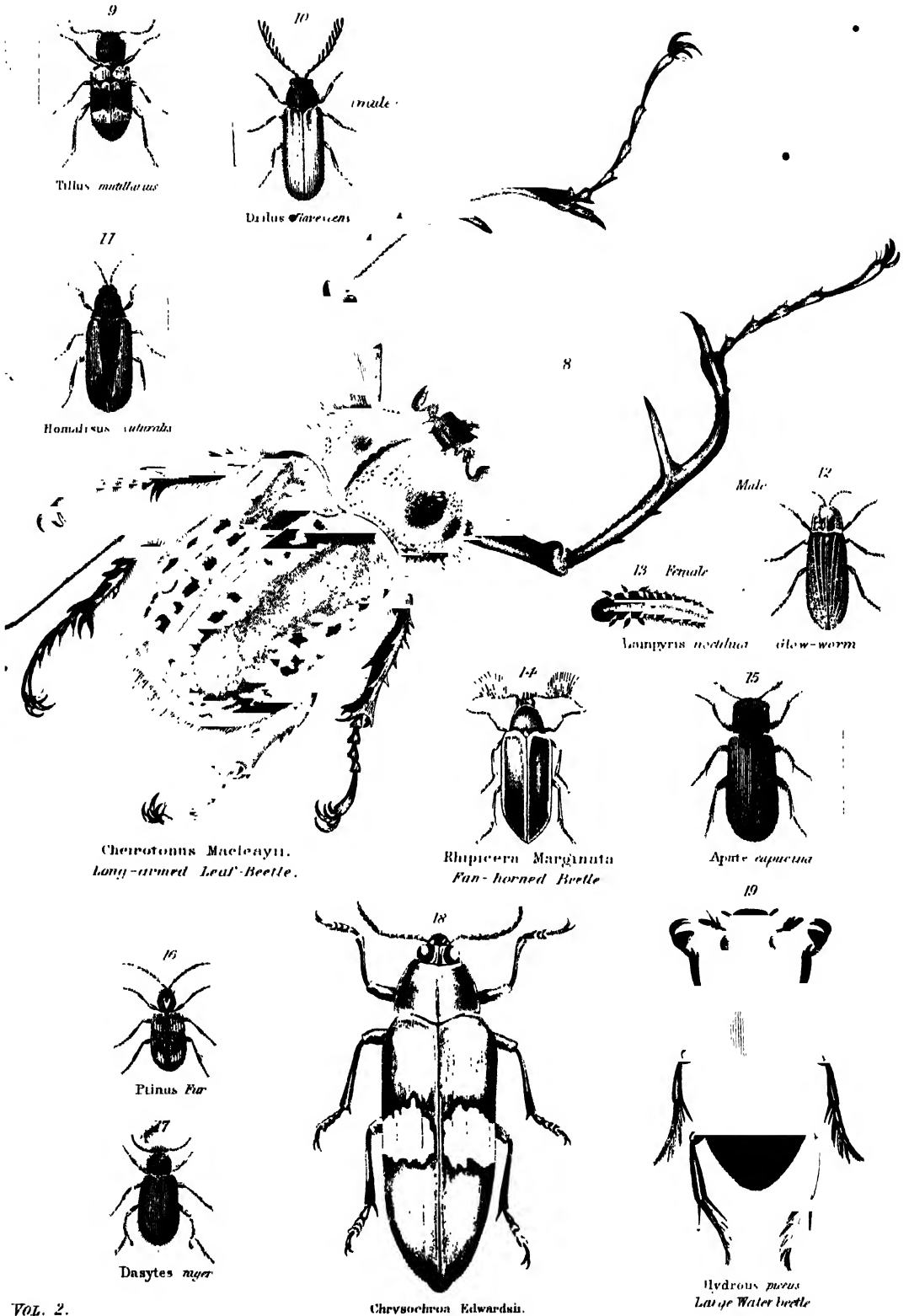
Schizorhina Bassii
Australian Rose Beetle



Lucanus Cervus *Stag Beetle*

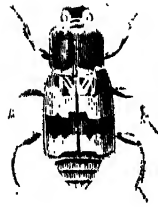


Cladognathus Parryi *Parry's Stag Beetle*





Nudula ori



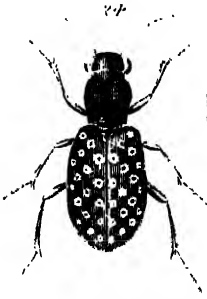
Neocryptus vegalle
Rhinotrit beetle



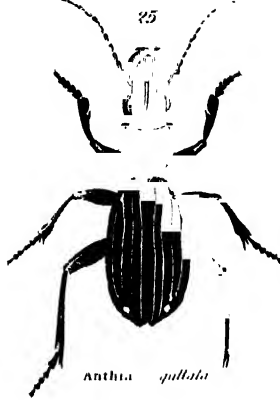
Scaphidium maculatum



Neocides littoralis



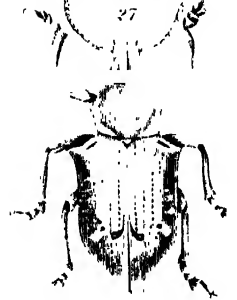
Elaphus ulmivorus



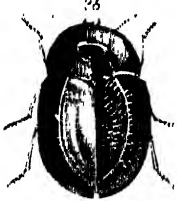
Anthia pallida



Brontis planatus



Cyphus Hancocki
Green & Gold weevil



Helorus perforatus
Barry perforated Helorus.



Typa cf. Perforated Tortoise-Beetle
Proptern Whitey
from Shung-hai



Solenix spinifex



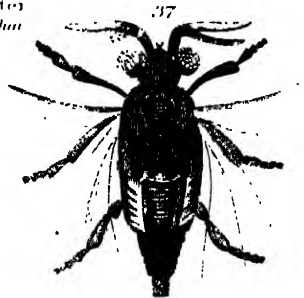
Anthicus pedestis



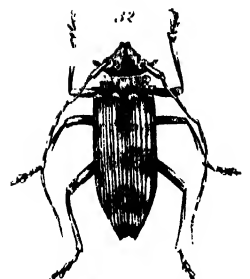
Pascoea ida



Proptern Whitey
N Chinese Tortoise Beetle



Xenos Vesparum



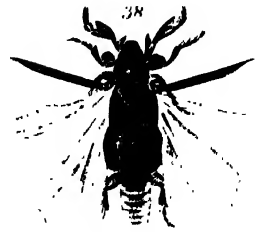
Pascoea ida
Green & Gold weevil



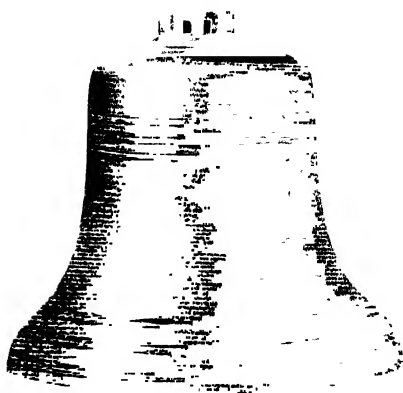
Hahetophagus carbon



Elenchus Walkeri



Stylops Dali



1. The approved form of Bell.

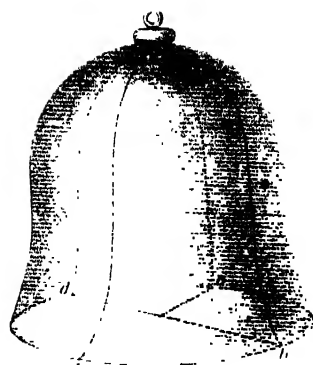
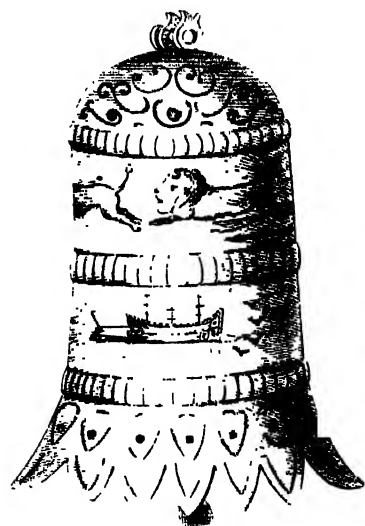


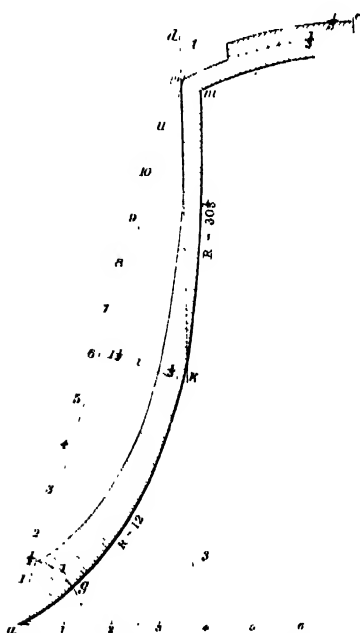
Diagram illustrative of the vibration in Bells



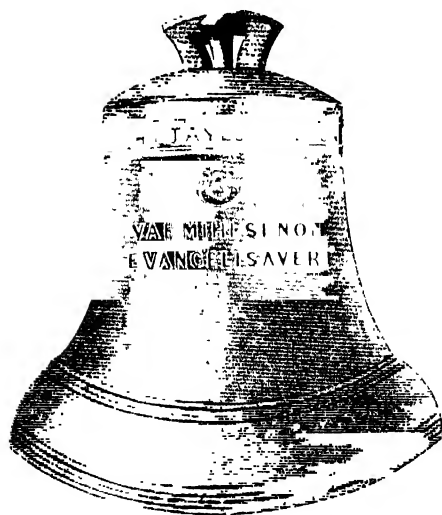
3. Flat Bell.



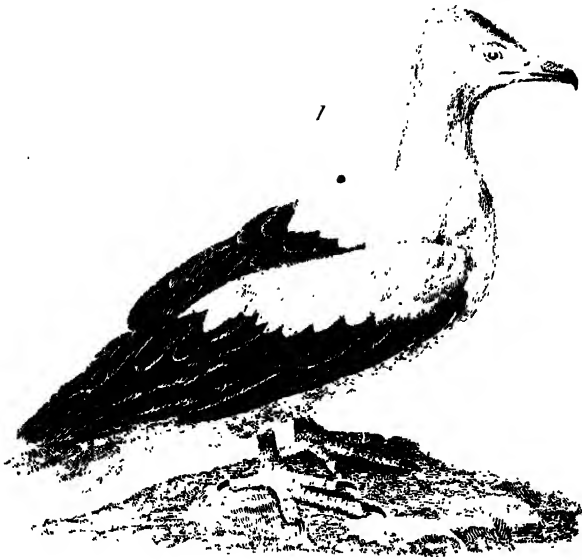
4. Chinese Bell



5. Section of the most approved form of Bell.



6. Great Bell of St Pauls



Neophron percnopterus Egyptian Vulture



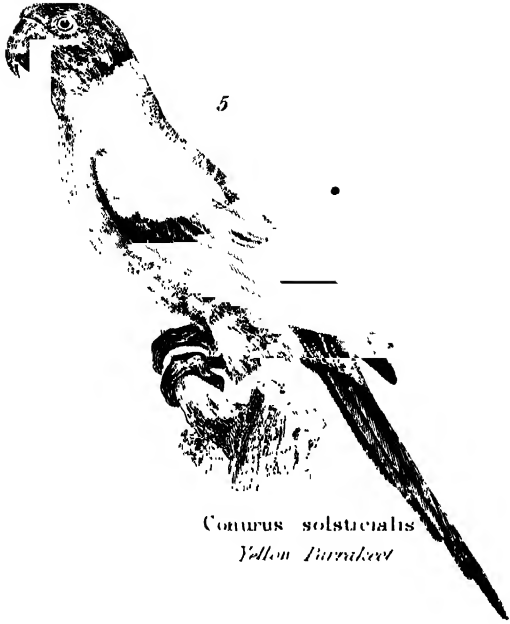
Hirundo urbica House Martin.



Jacamerops grandis Great Jacamar



Meesistura caudata Long-tailed Titmouse



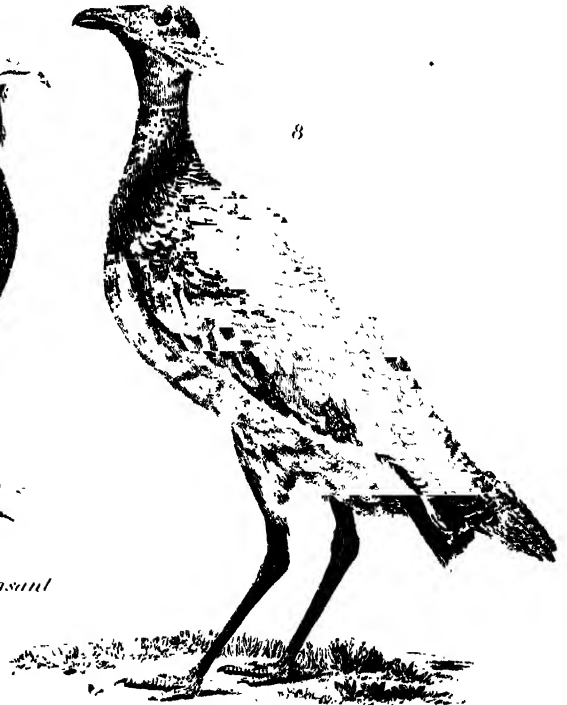
Coturnix solstitialis
Yellow Parakeet



Carpophaga magnifica *Magnificent Fruit Pigeon*



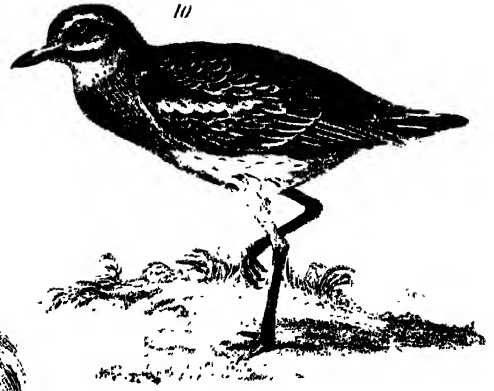
Tragopan satyrus *Nepal Horned Pheasant*



Otis tarda *Great Bustard*



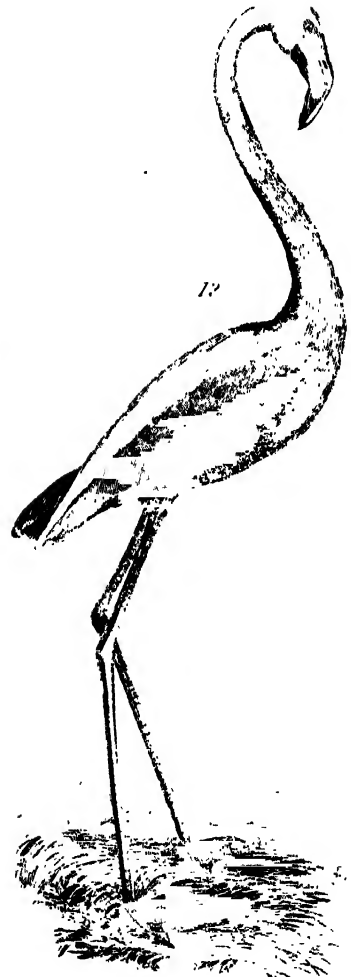
Ardea egretta Great Egret.



Edicnemus crepitans Common Thick-knee



Cariama cristata Marquess Curassow



Phoenicopterus ruber Red Flamingo.



Spatula clypeata Shoveller



Diomedea exulans Wandering Albatross

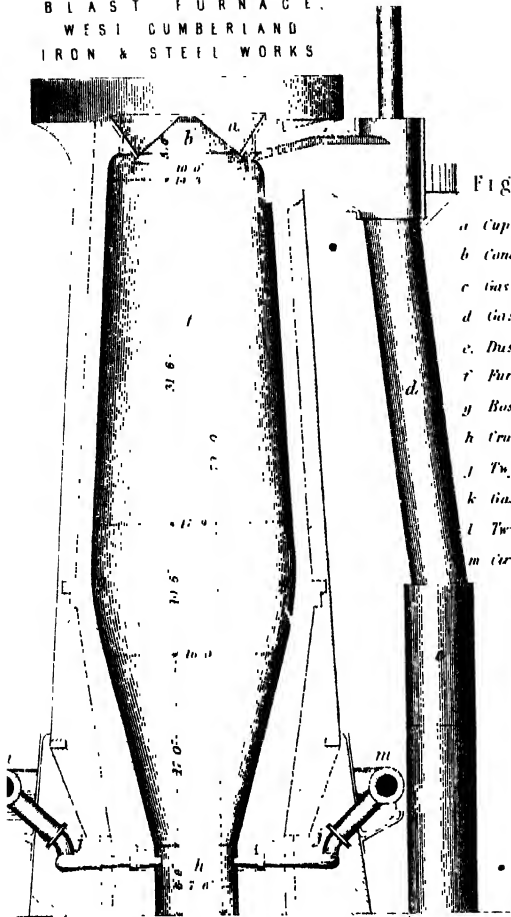
Mergus Merganser Merganser

BLAST FURNACE,
WEST CUMBERLAND
IRON & STEEL WORKS

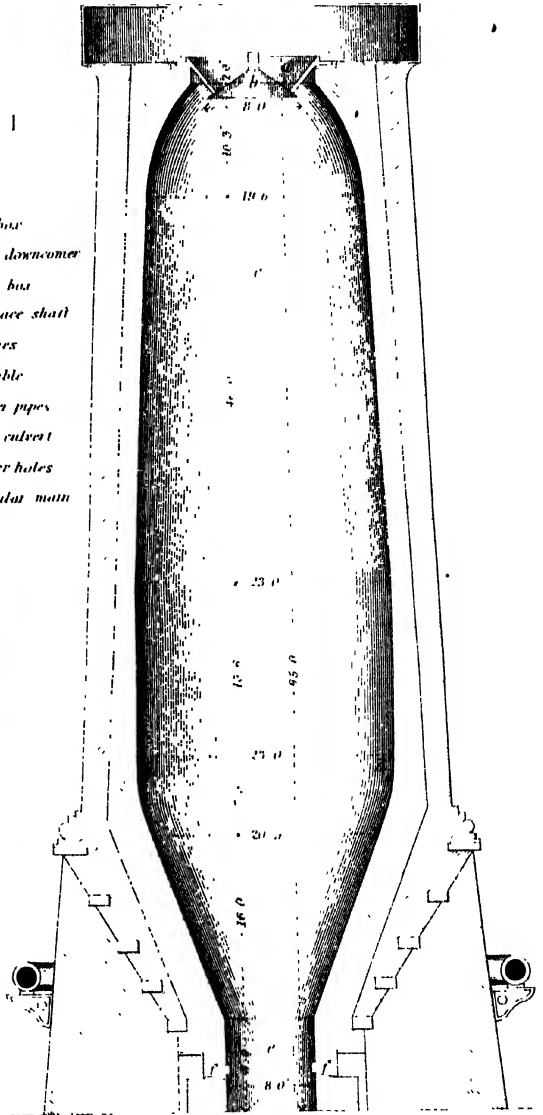
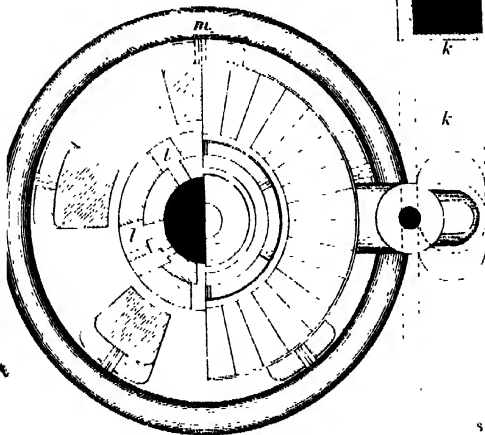
BLAST FURNACE, ETON IRON WORKS

Fig. 1

- a Cup
- b Cone
- c Gas box
- d Gas downcomer
- e Dust box
- f Furnace shaft
- g Boshes
- h Crucible
- i Taper pipes
- k Gas culvert
- l Taper holes
- m Circulat main



Cubic Contents 10388 Feet



Cubic Contents 28800 Feet

Fig. 2

- a Cup
- b Cone
- c Furnace shaft
- d Boshes
- e Crucible
- f Tapers

SCALE

10' 0" 5' 0" 10' 0" 15' 0" 20' 0" 25' 0" 30' 0" 35' 0" 40' 0" 45' 0" 50' 0" 55' 0" 60' 0" 65' 0" 70' 0" 75' 0" 80' 0" 85' 0" 90' 0" 95' 0" 100' 0"

LIST OF PLATES.

VOL. II.

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AURORA,	To face Title, VOL. II.
ASSAY,	PLATE I.
ATHENS, ANTIQUITIES OF,	COLOURED MAP.
AUSTRALIA,	" "
AUSTRIA,	" "
AUTOGRAPHS,	PLATES I.-V.
BACKBONE,	" I. IV.
BALLOONS,	" I.-IV.
BAROMETER,	" I.-II.
BASALT,	" I.
BASILICA, AND BYZANTINE ARCHITECTURE,	" I.
BATS,	" I.
BATTERY,	" I.
BAYEUX TAPESTRY,	" I.-II.
BEAR,	" I.
BEER,	" I.
BEETLES,	" I. III.
BELLS,	" I.
BIRDS,	" I.-V.
BLAST FURNACE,	" I.

NATIONAL ENCYCLOPÆDIA

UNIVERSAL KNOWLEDGE.

ASKEW.

ASP.

AS'KEW, ANN, the daughter of Sir William Askew, of Kelsey in Lincolnshire, lived in the reign of Henry VIII. In early life she embraced the doctrines of the Reformation. For this reason, as it appears, she was abandoned or ill-treated by her husband, named Kyne, and went to London to sue for a separation from him. She was accused of heresy on his evidence, and after a torturing examination was burnt at Smithfield on 16th July, 1546.

ASMANSHAUSEN, a village in Nassau famed for the wine which is produced by the neighbouring vineyards. Of this there are two varieties, the red and the white, but the former is most highly esteemed. That produced by the duen vineyards at Wiesbaden is preferred to all the other red wines of the Rhine.

ASMODE'US (Heb. *Aschmedai*), an evil demon; according to later Jewish tradition, probably identical with Abaddon or Apollyon. In the Talmud he is called the prince of the demons, and is said to have driven Solomon from his kingdom, for which he was punished by being compelled to assist in the building of the temple. In the book of Tobit he is described as loving Sura and causing her to strangle seven husbands on their respective bridal nights, but as being driven off to Egypt by the smell of the heart and liver of a fish which Tobit burnt on the occasion of his marriage with her. From this story he has sometimes been playfully referred to as the evil genius of matrimony.

ASMONÆANS. The Asmonæan family derived their name, according to Josephus ("Antiq." xii. cap. 6), from Asmonæus. The son of Asmonæus was Symeon or Simon, whose son Johannes was the father of Mattathias, the father of the MACCABEES.

The Jews had for many years been subject to the arbitrary rule of the Syrian kings, when Mattathias and his five heroic sons, John, Simon, Judas, Eleazar, and Jonathan, commenced their victorious resistance to the attempt of Antiochus Epiphanes to compel the Jews to exchange their religion for the idolatry of their Syro-Macedonian oppressors. This struggle is described in the books of the Maccabees, which are included among the books of the Apocrypha. It is also detailed in the "Antiquities" of Josephus.

The power of the Asmonæan dynasty lasted from the year B.C. 166 to B.C. 87; but the family survived the dynasty. It arose from the heroic Maccabees. Their first descendants ruled without the title of king; they possessed the functions of the high-priest, the chief civil magistrate, and the chief commander of the army. Their power was based upon the grateful esteem of the Jewish nation, which they had restored to independence. The later Asmonæan princes adopted the title of king; but they lost, with the pious virtue of their ancestors, the love of the nation, and subsequently, by family discord, the kingdom itself.

VOL. II.

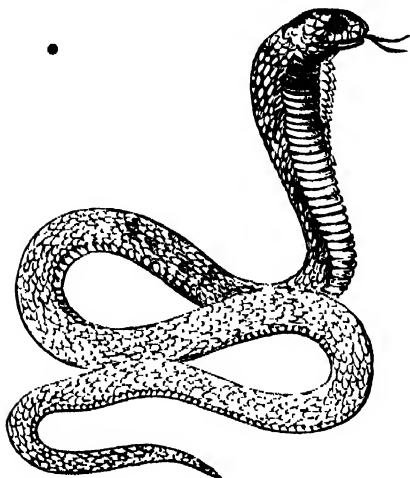
The three last who reigned were Aristobulus, Hyrcanus II., and Antigonus. It was during the reign of the former that the Roman power commenced in Judea, and he himself was taken captive to Rome. The government of Hyrcanus was disturbed by continual commotions. C. Julius Cæsar gave him many of the neighbouring towns, and allowed him to rebuild the walls of Jerusalem; but Antipater, the Idumæan, wrested from him all except the name of ruler. Antigonus, the son of Aristobulus, took Hyrcanus prisoner, and to disable him for exercising the sacerdotal functions cut off his ears. Hyrcanus was put to death, B.C. 30, by Herod, the son of Antipater the Idumæan. On the death of Hyrcanus, Antigonus became king; but being soon after besieged by M. Antonius at the expiration of three years from the commencement of his reign he was put to death by the Romans, B.C. 37, to make way for Herod, with whom commenced a new dynasty, A.D. 37. To confirm his authority Herod married Mariamne, granddaughter of Hyrcanus II., and made her brother Aristobulus III. high-priest. [See HEROD.] Aristobulus III. was put to death by Herod, B.C. 35. The historian Josephus was descended from the Asmonæan family. In the commencement of his autobiography he says, "By my mother I am of the royal blood; for the children of Asmonæus, from whom that family was derived, had both the office of high-priesthood and the dignity of a king for a long time together. I will accordingly set down my progenitors in order."

("The Five Books of the Maccabees, with Notes and Illustrations," by Henry Cotton, D.C.L.)

ASP. The name comes to us from the Greek *aspis*, and has been applied to small venomous snakes of more than one species. The *Vipera aspis* is found in the south of Europe. It is closely allied to the English viper, but has a larger head, and is of a more slender form. The *Vipera cerastes*, a native of Egypt, is supposed by some to have been the "pretty worm of Nilus" which Cleopatra used to end her life. One of the scales over each eye is produced into a sort of horn, the head is triangular, and the colour of the body gray. Another snake, very common in Egypt and Arabia, is the Haje (*Naja Haje*), and most probably is the asp to which the ancients usually refer.

The Egyptians sculptured it on their temples as the emblem of divinity, which they supposed to protect the world. The asp has the power of expanding the skin of the neck into a hood, on which, when thus stretched, the scales appear as dots with intervals between them. These snakes live in pairs, taking up their abode in ruins, the cavities of old walls, and is even common in the open fields. They defend each other with indomitable resolution, and if one happens to be killed the survivors dart upon the destroyer, and will follow him with great perseverance,

seeking revenge, and he must either save himself by a speedy flight or by a well-timed blow. When excited the Haje raises itself up on its tail, expands its hood, hisses loudly, and darts with a spring upon its enemy, repeating the attack if it misses its aim. It is from 3 to 5 feet in length,



The Haje.

and of a dark green colour, marked with bands of blackish brown.

The Cobra di Capello of India, and the "Geel Copell" at the Cape of Good Hope, belong to the same genus as the Haje.

ASPARAGUS, a genus of monocotyledonous plants belonging to the order LILIACEÆ.

The most remarkable species is the common cultivated asparagus (*Asparagus officinalis*), which is found in sandy and maritime places in most parts of the middle and south of Europe, the Crimea, and also of Siberia and Japan. It is found in a few places in Britain, as at Portland and at Kynance Cove, Cornwall.

The asparagus plant should have a light soil, which offers little resistance either to the emission of its roots or the protrusion of its stems; the soil should also be capable of both receiving and parting with water readily. To give vigour to the shoots, as much manure is added as the cultivator can afford to apply to it. When the seed is sown, or the young plants finally placed in the situation in which they are to produce a crop, an abundant supply of decayed manure, or of bones or parings of horses' hoofs, is buried below them; and they are also annually top-dressed with finely pulverized manure, when the beds are arranged in the winter. Attention being paid to these circumstances, asparagus is one of the easiest of all vegetables to cultivate; but no art or skill will produce precisely the soil which is most favourable for its growth. This exists naturally in some places in the fittest of all possible states, and it is there only that it is to be obtained in its greatest perfection; as in the rich alluvial soil of Mortlake and other places round London. In some of these places it has been produced of such extraordinary size that 110 heads in a state fit for the kitchen have been known to weigh more than 32 lbs.

ASPASIA, the celebrated Hetaira of Athens, was a native of Miletus, and the daughter of Axiochus. She gained entire possession of the affections of Pericles, who divorced his first wife with her own consent, according to Plutarch, in order to attach himself to Aspasia, whom he could not marry, as she was a foreigner. His son by her was, however, legitimated by a special decree of the

assembly. We are told little of her beauty, but much of her mental powers and cultivation. Plutarch says that Pericles resorted to her "because she was a wise woman, and had great understanding in matters of government." Socrates sometimes visited her in company with his friends (Xenophon, "Mem." II. vi. 36; Plato, "Menexenus"). On this and similar authority we learn that Pericles was indebted to Aspasia for much of that mental cultivation in which he excelled all men of his age. She is accused of having led the Athenians by her influence with Pericles into two wars; but as to one at least, the Samian war, B.C. 440, the evidence is not complete. Aristophanes, a very untrustworthy authority, in his comedy of the "Acharnians," charges Pericles with having involved the country in a quarrel with Megara, by a non-intercourse act, in revenge for the forcible abduction by some Megarians of two young attendants upon Aspasia. Hermippus the comedian prosecuted Aspasia on the charge of impiety (Plutarch, "Pericles," c. 21). We are told on the same authority that nothing but the personal exertions, the tears, and entreaties of Pericles procured her acquittal. But these stories are not well authenticated. The fact of Aspasia's intercourse with the chief men of her age, and the acknowledgment of her great talents, is undisputed. After the death of Pericles (B.C. 429), Aspasia lived with Lysicles, a wealthy dealer in cattle, who, through her instruction and influence, became an excellent orator, and one of the foremost men of Athens (Plutarch, "Pericles," c. 21, 30, 32; Bayle).

ASPEN, or Trembling Poplar (*Populus tremula*), is a native of moist woods in Great Britain, and in Scotland is found at an elevation of 1500 feet above the level of the sea. It is also found in the whole of the south of Europe, in the Caucasus, in Lapland, and very abundantly in Russia.

The **POPULAINS** generally cannot be recommended for growth as timber. The wood of the aspen is used to make arrows.

ASPERN, a small village in Austria, situated on an arm of the Danube, nearly opposite to Vienna, which is only memorable as the scene of a terrible battle between the French, under Napoleon, and the Austrians, led by the Archduke Charles, on the 21st and 22nd of May, 1809; at its close the French were obliged to retreat, having lost 30,000 men in killed and wounded. During the engagement the village of Aspern was converted into a heap of ruins, after enduring thirteen successive assaults. Marshal Lannes was amongst the killed on the side of the French.

ASPHALTE, **ASPHALTUM**, or **BITUMEN** is one of the products arising from the decomposition of vegetable matter. It occurs in various forms, the most abundant being the compact variety. This is found in masses, is of a dark-brown or black colour, with a conchoidal fracture and resinous lustre. It is opaque and exceedingly brittle at a low temperature, but fuses at a heat of 212° Fahr. In density it varies from that of water to 1·6, and its combustion, which is rapid and brilliant, is attended with a thick red smoke. It is found in many parts of the world, existing in considerable quantities in North and South America, the West Indian Islands, Borneo, Turkey in Asia, in Albania, Alsace, and Switzerland. The largest natural deposit is in the island of Trinidad, in the West Indies, where it forms a lake known as the Pitch Lake, 99 acres in extent, and of unknown depth. It was formerly found floating on the surface of the Dead Sea (or *Lacus Asphaltites*, from whence the name is derived), but very little is now found there. It was used as mortar by the ancient Babylonians, and is referred to as slime in the story of the Tower of Babel (Gen. xi. 3), and that of the defeat of the allied kings by Abraham, where it is said "the vale of Siddim was full of slime pits" (Gen. xiv. 10). It was also largely used by the ancient Egyptians for the purpose of embalming bodies.

The name asphalt stone is given to some limestone rocks which contain an amount varying from 7 to 20 per cent. of asphalt diffused through them, and which of late years have been much used as a material for street pavements, for the platforms of railway stations, and for flooring, roofing, and protecting buildings in various ways from damp. It was introduced into England as early as 1837, but did not find much favour. Between 1854 and 1870, however, most of the leading streets of Paris were paved with asphalt; and in 1869 an experiment was made in London by the Val de Travers Asphalt Company, who laid 485 square yards in Threadneedle Street. Foot pavements were also laid down at the same time as the carriage way, and after twelve months' wear the result was so satisfactory that several other streets were paved in the same way. Ever since its use has been extending year by year throughout the country.

The asphalt chiefly employed is procured from the Val de Travers, near Neuchâtel, Switzerland; and from Limmers, near Hanover. The Val de Travers asphalt is in the first instance a limestone rock, and contains about 12 per cent. of mineral bitumen diffused throughout it. Prior to use the stone is crushed by machinery into a powder something like moulder's sand. A foundation of concrete or other similar substance having been laid, the asphalt is placed on it and welded together (the bitumen in it acting as a cement) by hot and cold pressure until it is compressed into an exceedingly hard and elastic substance.

The chief advantages of the asphalt pavement are, that the surface being smooth, and without joints, the traction of vehicles is so light that wheels of carriages run over it almost as easily and smoothly as on a street tramway, and it is nearly if not quite as noiseless as a wooden pavement. It is impervious to moisture; water, therefore, falling on it runs off, or is evaporated quickly; and the general comfort to the inhabitants, as well as to the passengers in the thoroughfares in which it is laid, is very great. The asphalt can be laid in about the same time as granite, and required more expeditiously.

These are the advantages of asphalt, but unfortunately experience shows there are serious objections to it on the ground of its affording so little foothold for horses that it is a prolific cause of accidents. In the course of 1874 the city of London authorities caused a series of observations to be made throughout fifty days, to determine the percentage of accidents under various conditions of weather upon asphalt, granite, and wooden paving respectively. The result was a most complete vindication of wood as the safest material out of the three, under either a damp, wet, or dry condition. It was found that granite, which soon becomes uneven and smooth to the foot, was the most slippery, asphalt the next so, and wood the least.

It is, however, only fair to state that the slipperiness of asphalt does not exist when it is clean, whether it be wet or dry; and the only way of keeping it clean is by constant washing. Recent experiments have proved that though the thickness of a layer of asphalt exposed to constant traffic decreases considerably, its density increases in the same proportion, so that there is little or no actual abrasion from the surface, but the material is merely compressed, and thus actually strengthened.

ASPHALTITES, LAKE, or DEAD SEA. See DEAD SEA.

ASPHODELÆÆ, a group of the LILIACEÆ, monocotyledonous plants, which form a very natural assemblage, for the most part easily recognized. They may be formed into two subdivisions.

The first, or the alliacious subdivision, in which there is no true stem, and which consists entirely of bulbous species. To this belong the onion, garlic, and their allies, together with the hyacinth, squill, and star of Bethlehem. A great number of this species are favourites with the horticulturist,

on account of their early appearance in the spring, and their easy cultivation.

The second subdivision, consisting of the true asphodels and those which resemble them, have no bulbs, but in their stead clusters of fleshy roots, such as we find in the asparagus, which belongs to this subdivision. The stems of these are frequently woody, but in that case they are branched. Dracena, or the gun dragon tree, is a most remarkable instance of this, it having almost the appearance of a dicotyledon when deprived of foliage. This subdivision also contains aloes, with their thick fleshy leaves and forked stems.

ASPHYXIA (a Greek word, *asphuxia*, which signifies a cessation of the pulsation) originally expressed any state of disease in which there was a suspension or loss of the heart's action, and a consequent failure of the pulse; but the term is now used to denote a suspension or loss of the power of respiration. The state of asphyxia is that in which the respiratory actions are either temporarily suspended or have wholly ceased—a state necessarily inducing such a change in the nature of the blood as is incompatible with the continuance of life. It is characterized by convulsive struggles, the lips, cheeks, and finger tips becoming black, followed by loss of consciousness and muscular power—the chest and heart gradually ceasing their motions, causing death at the end of from two to five minutes. After death the lungs will be found to contain more blood than usual; the right side of the heart and large veins also will be gorged with blood, while the left ventricle is firmly contracted.

Asphyxia may be brought about in a variety of ways, such as breathing carbonic acid gas, strangulation, choking, pressure on the chest or over the mouth and nostrils, drowning, the action of a narcotic poison, &c. Fish and aquatic animals may be asphyxiated by the water becoming deprived of oxygen or becoming fouled by poisonous gases, &c. Though death may take place at the end of a few minutes it is often much longer before it ensues, and the restoration of asphyxiated persons may be attempted with hopes of success a long time after apparent death. In such cases the mouth, nostrils, and throat should if possible be cleared, and all pressure removed from the neck and chest. The patient should then be placed face downwards, one of the arms being placed under the forehead, the chest being supported by a folded coat, cloth, or any suitable article, and then gently turned round, so that the body rests upon the side and a little beyond. The body should then be briskly turned back on the face, and a little brisk pressure made on the back between and below the shoulder-blades, removing the pressure when the body is again turned upon the side. These movements should be repeated fifteen times a minute, and should be persevered in for a long time, especially where the asphyxia is caused by drowning, as cases have been known where it has proved successful after being pursued for over an hour without apparent result.

ASPHYXIANTS, in warfare, are projectiles filled with chemical substances of a poisonous or suffocating nature. The idea aimed at in the construction of these horrible instruments of death has been to carry into an enemy's ship, or the casemates of a fort, some means of spreading a suffocating vapour which would destroy the crews or gunners. Experiments have been carried out with these missiles both in France and England, but they have not, up to the present, been openly used in warfare, or adopted as part of a naval armament. Other forms of these weapons have been devised which would combine incendiary and suffocating effects, and during the war between Russia and Turkey in 1878-79 an inventor designed some swift launches for the purpose of pumping an ignited stream of petroleum into an enemy's vessel. This, it was contended, would not only set her on fire, but the vapour

generated would suffocate all who came within its influence. The idea was not practically tested, and the inventor appeared to have overlooked the danger to which the crews of such launches would be exposed in carrying such a dangerous cargo under the fire of a ship of war.

ASPINWALL. See COLON.

ASPIRATE. This term is often loosely used by English writers, sometimes to denote the rough breathing indicated by α in Greek, and by the letter h in most European alphabets, at other times as the name for those sounds which are more properly called spirants, as th in *thin*, th in *than*, the Greek letters θ and δ (Deltah) as pronounced by the modern Greeks, among the dentals; f and v , modern Greek ϕ and β , among the labials; $ch = \chi$, and $gh = \gamma$, among the gutturals. This usage is now universally rejected among competent philologists, and the term aspirate is confined to the aspirates proper, such as kh , gh ; th , dh ; ph , bh in the Indian languages—an approximation to which may be heard in the words *inkhorn*, *loghouse*; *mudhouse*, *hothouse*; *upharal*, *abhorrence*; or in the initial utterance of p in the Anglo Irish interjection "By the powers!" A good example is also the name of the Maun mountain Ben-y-phot as pronounced by a native.

ASPLENIUM is a genus of FERNS, in which the sori spring singly from the sides of the veins, and are covered by long, straight scales (*indusia*). The species are commonly known as Spleenworts.

Asplenium Adnigrum aigrum (black maidenhair spleenwort) is a native of Europe, and is abundantly distributed throughout the United Kingdom. It is one of the ferns formerly much used in medicine, and is stated by Ray to be efficacious in cough, asthma, pleuritis, jaundice, stone, gravel, and other diseases. The fronds are twice and thrice pinnate, triangular, and the sori long. *Asplenium Rutemuraria* (wall rue), is very common on rocks and old walls in Great Britain and throughout Europe, and is also a native of North America. It was at one time used as a remedy in coughs and asthmas, obstructions of the liver, and in cutaneous diseases; but has now fallen into disuse. The fronds are twice pinnate, with the mid vein of the pinnules wanting; the *indusia* are jagged. *Asplenium Trichomanes* (common maidenhair or spleenwort) has been also used in medicine, and for the same diseases as the previous species; but it has fallen now entirely into disuse. The fronds are pinnate, and the leaf-stalk black, not winged. *Asplenium viride* differs from this in having the leaf-stalk green above; *Asplenium marinum* has a winged leaf-stalk, and the frond has a leathery texture. In *Asplenium fontanum* and *Asplenium lanceolatum* the fronds are twice pinnate, lance-shaped, with short sori; the leaf stalk in the former is winged and smooth. In *Asplenium germanicum* the fronds are simply pinnate, the pinnules alternate, and with the mid veins wanting. The fronds of *Asplenium septentrionale* are narrow, two or three cleft, with the divisions tapering to a point. (Moore's "British Ferns.")

These and other ferns may be easily cultivated by placing them in situations resembling their natural habitats. They require a pure atmosphere, plenty of space, and natural shade, with a due supply of water. They may be planted on decayed wood, in holes of rocks and brick, with almost any soil.

ASPRAMONTE, a small town in Italy, near Reggio, the scene of the defeat of Garibaldi by the royal troops, when he had injudiciously created a rising against the French occupation of Rome. This took place on 29th August, 1862. Garibaldi himself was wounded, and his volunteers surrendered, he having ordered them to abstain from firing on the soldiers of the king.

ASS, a domestic animal, too well known to need description, and too much undervalued in our island to receive much attention. The ass is the patient drudge of the cottager, and its services are mostly paid by ill treatment. In

the East, however, where from the most remote times it was kept for the service of man, it is more justly appreciated, and its use is not limited to the humbler classes. The finest asses are those of Arabia; their coat is smooth and clean; they carry the head elevated, have fine and well-formed legs, which they throw out gracefully in walking or galloping. They are used only for the saddle, and are imported in great numbers into Persia, where they yield high prices; they are taught a kind of easy ambling pace, are richly caparisoned, and used only by the rich and luxurious nobles. A fine breed, of Arab lineage, bred exclusively for the saddle, exists in Syria; a small spirited and graceful kind is also found in Syria, upon which the ladies ride from preference; and besides this there is a stout breed fitted for ordinary labour. Another breed, that of Damascus, is characterized by the length of its body and of its ears; it is much employed by the bakers of Damascus in carrying flour and brushwood. The ordinary asses of Persia are strong, but in other respects not to be compared with those of Arabia. As we proceed further eastward the ass degenerates, and in India it is very small, of inferior qualities, and used only by the people of the lowest caste.

The finest asses of Europe are those of Malta and Spain. Italy also possesses a superior breed; and the same remark applies to some parts of France, as Le Pottou and Le Mirabalais. In the north of Europe the ass is little known; and in England, although it is said to have been known and kept in the reign of Ethelred, it could not have been common, and perhaps soon became extinct, for it was either extremely rare or not extant until after the time of Elizabeth.

The hybrid, between the male ass and mare, is termed a *mule*; that between the horse and female ass a *hinney*. The latter is seldom seen, and is of little value. The mules of Spain are celebrated for strength, stature, and beauty; nor are those of South America (where numbers of asses are kept for interbreeding with mares) much inferior.

There are abundant allusions both to the ass and to the mule in the Scriptures, which prove the estimation in which they were held—the highest personages riding on ordinary occasions upon them. The horse was used in war, or employed to swell the pomp of solemn processions. Although we cannot determine when the mule first came to take its place among our domestic animals, we know that it must have been antecedent to the time of David, for he had saddle-mules; and from other passages it would appear that they were common. We read of the couriers of Persia and Media riding upon mules and camels (Esth. viii. 11). The most valuable mules in Syria, bred from mares of the Arab strain, are in great request, and celebrated for beauty and spirit.

The wild origin of the domestic ass is believed by Darwin and others to be the *Assinus lenipus*, found in Abyssinia, and which has long acute ears and the bray peculiar to the domestic kinds. It also has cross bands on its legs, a feature occasionally met with in tame breeds.

Shagreen leather is made from the skin of the ass, which is also used for other purposes. See HORSE.

ASSAM, a province at the north-eastern extremity of British India, which was constituted in its present form in 1874, when the eleven districts included therein were separated from the lieutenant-governorship of Bengal, and erected into an independent administration under a chief commissioner. The tract thus united under one government is naturally divided into three portions—the valleys along which run the Brahmaputra and the Surma, together with the mountainous watershed which intervenes between these two rivers. According to the latest published statistics, the total area of the province is estimated at 42,000 square miles, and the population exceeds 4,000,000. Formerly the name of Assam was given to the fertile valley of the Brahmaputra alone, which, however, only includes about 20,000 square miles. This valley is an alluvial plain, about 450 miles

long, and on an average 50 miles wide; and the river is navigable throughout its entire length. The soil here is for the most part a rich black loam, but permanent cultivation is only possible at a distance of about 6 miles from the river, where the ground rises gradually towards the hills. The low lands along the banks, being liable to inundations, are abandoned to a wild overgrowth of reeds or grass jungle. The Surma valley reproduces the same phenomena on a smaller scale. The hills of Assam abound in mineral resources, including coal, iron, and limestone. The coalbeds at the foot of the Naga Hills were carefully surveyed in 1876; they extend over a tract of country 110 miles long, and are computed to contain not less than 40,000,000 tons. The coal is stated to be of excellent quality; but owing to the expense of working, and the difficulty of transport, it has not been found possible as yet to compete with the supplies brought from Bengal. The province contains many large forests, and considerable quantities of valuable timber are exported. Among the other articles found in the country are petroleum, gold dust, caoutchouc, ivory, amber, musk, &c. There are nearly 4000 miles of navigable rivers, but no railways or canals. The wild animals in Assam include the elephant, bear, deer, wild buffalo, tiger, leopard, and rhinoceros. Fish and wild ducks are plentiful everywhere. A special license from the government is required to capture wild elephants, and it is only granted under stringent conditions.

The climate of Assam is excessively humid, and somewhat tropical in character--the seasons being distinguished by the abundance of rain or the continuance of dry weather. The air of the higher ranges and plateaus in the hill tracts is very salubrious--the extremes of heat and cold being both unknown. The rainy season lasts from March to October, and during that period immense quantities of water are brought down by the rivers from the northern mountains. Owing to these annual inundations, which deposit a fresh top-dressing every year, the soil all along the valley is extremely fertile--neither manure nor irrigation being required. Rice is very generally grown, and in some places no less than three crops are raised annually. But by far the most important object of cultivation in Assam in recent years has been the tea plant, the growth of which has been so rapidly extended that the entire country will probably in time present the aspect of one immense tea plantation. It was carefully attended to in the first instance by able Chinese instructors, and has since been fostered by British capital, aided by European supervision. Assam tea is now almost universally known and appreciated, and often realizes a higher price than that brought from China. As many as 800 lbs. per acre have been picked in some gardens; and the total annual crop is estimated at 30,000,000 lbs. The land best suited for the plant is the virgin soil of the dense forests at the foot of the hills, where the climate is hot and moist. This soil is found in every part of Assam; but by far the largest number of gardens are in the four districts of Cachar, Lakhimpur, Sibsagur, and Darrang.

With the exception of the articles above mentioned the trade and commerce of Assam is comparatively unimportant, the population being almost entirely rural, and depending for their livelihood upon agriculture. The mountains which surround the province on all sides, except the west, are of such a description as to preclude almost entirely the possibility of conveying commodities to the contiguous countries, and the commercial intercourse of Assam at present is confined to that with Bengal. Besides tea and other products previously mentioned, Assam exports the coarsest kinds of silk, but not in great quantity, and receives in return cotton manufactures, broad cloths, Indian fabrics, salt, opium, glass, earthenware, tobacco, and betel.

The administration of the province is intrusted to a chief commissioner, acting immediately under the orders of the

government of India. The headquarters and the residence of the commissioner are at the station of Shillong, in the Khasi Hills. Until recently education was much neglected, but during the past few years many successful schools have been established.

The chief town in the province of Assam is Sylhet, which contains nearly 20,000 inhabitants; there is hardly any other place which deserves to be called a town; for except the buildings that have been erected by the English, chiefly for government purposes, they exhibit only a collection of huts, and contain no shops, the inhabitants of the country supplying all their necessities by domestic industries.

The Assamese, or inhabitants of the plains, appear from their physical constitution, their language, and their religion, to be of Hindu extraction. Their religion is Brahmanism, but many of them belong to mixed tribes. In the parts adjacent to Bengal there are many Mohammedans.

The mountaineers who inhabit the ranges to the north, east, and south of the valleys are mostly Buddhists, and their habitations are commonly much larger and more convenient than those of the inhabitants of the plains. These mountaineers include about ten distinct tribes, and speak languages altogether differing from that of the Assamese.

Assam seems to have been for a long time under the sway of sovereigns of Hindu origin, and to have undergone many revolutions. In the seventeenth century the Mogul emperors of Hindustan sent a numerous army to subvert Assam; but disease and other calamities frustrated the design of conquest. In modern times the continual discords and intrigues in the royal family brought it under the dominion of the Burmese, who treated the people and the sovereign with much severity. The Burmese were expelled almost without a struggle by the English in 1824, and obliged by the peace of 1826 to leave the country and its sovereignty under the protection of the British. The upper portion of the province was, however, conferred as a separate principality on the native rajah, whom the Burmese had driven away; and it was only in 1838 that, in consequence of his misgovernment, the entire country was actually placed under British administration.

ASSASSINS, a military and religious order formed in Persia in the eleventh century. It was a ramification of the Ismaelites, who were themselves a branch of the great Mohammedan sect of the Shiites, the supporters of the claims of Ali's posterity to the caliphate. [See ALI BEN ABI TALEB.] But among the Ismaelites there were many who were Mussulmans only in appearance, and whose secret doctrine amounted to this, that no action was either good or bad in itself, and that all religions were the invention of men. These unbelievers were formed into a secret society by one Abdallah, a man of the old Persian race, who had been brought up in the religion of the Magi, and was a hater of the Arabs and of their faith. Under the protection of the Ismaelites a lodge of the secret doctrine was established at Cairo, and its members spread over a great part of Asia. Their ostensible object was to maintain the claims of the Fatimide caliphs to universal dominion, and to urge the destruction of the caliphs of Bagdad as usurpers. One of the adepts, Hassan ben Sabah, thought of turning these instruments to his own advantage, and after many vicissitudes and wanderings obtained possession, by the aid of his brethren, of the hill-fort of Alamoot (or "culture's nest"), situated to the north of Casvin, in Persia, and there (A.D. 1090) established an independent society or order, consisting of seven degrees, with himself at the head as sheikh al jebel, i.e. "sheikh of the mountain." Hassan drew out for the initiated a catechism consisting of seven heads, which did away effectually with all fixed rules of morality or faith. But this secret knowledge was confined to a few; the rest were

bound to a strict observance of the letter of the Koran. The most effectual class in the order were the fedavees—youths often purchased or stolen from their parents when children, and brought up under a particular system of education calculated to impress upon their minds the omnipotence of the sheikh, and the criminality as well as utter impossibility of evading his orders, which were like the mandates of Heaven itself. These fedavees were clothed in white, with red bonnets and girdles, and armed with sharp daggers; but they assumed all sorts of disguises when sent on a mission. Marco Polo gives a curious romantic account of the garden at Alamoot, to which the fedavee designed for an important mission was carried in a state of temporary stupor produced by powerful opiates, and where, on awakening, he found everything that could excite and gratify his senses. He was made to believe that this was a foretaste of the paradise of the prophet, reserved for his faithful and devoted servants, and thus became willing to encounter death, even under the most appalling forms, in order to secure a permanent seat in the abode of bliss. Marco Polo's narrative is confirmed by Arabian writers, and Von Hammer inclines to believe it true in the main; others attribute the visions in the garden to the effects of the intoxicating preparation administered to the fedavees. The name of *hashish*, which is that of an opiate made from hemp-leaves, is supposed to have been the origin of the word "assassins." The word becoming familiar to the crusaders was by them carried to Europe, where it was used as synonymous with that of *sicarius*, or hired murderer.

Hassan ben Sabah, having extended his order by force, treachery, and especially by assassination, over great part of the Mohammedan world, died at Alamoot in 1124, after thirty-five years' reign. He had several successors, all of whom adopted the practice of secret assassination, and several princes fell under the daggers of their followers; among them was Raymond, count of Tripoli, in 1151. At length the great Mongol conqueror, Mangoo Khan, sent his brother Hulakoo to exterminate the murderous sect, which he effected A.D. 1256.

The Syrian branch of the Assassins, however, continued to exist for some years later. Massyad, not far from Beyrout, was their principal stronghold. The history of this branch is the most familiar to Europeans, being much interwoven with that of the crusaders and of the great Sultan Saladin. The latter was several times in danger from the daggers of the Assassins. They murdered the Marquis of Montferrat in 1192, Louis of Bavaria in 1213, and the Khan of Tartary in 1254. The Syrian Assassins were conquered by Bibars, the Mameluke Sultan of Egypt, fourteen years after the destruction of the Persian branch by the Mongols. Many, however, found refuge in the mountains of Syria, and became mixed with the Yezed Kurds; and some of the tenets of the order are believed to linger still among them.

ASSAULT AND BATTERY. An assault has been commonly defined "an attempt or offer with force and violence to do a corporal hurt to another." Thus presenting a gun at a person within the distance to which it will carry, throwing a stone or other missile at him, drawing a sword and waving it, or even holding up a fist in a threatening manner, are instances of assault. But no words, however insolent and provoking, unaccompanied by an act of violence, amount to an assault.

A *battery*, which is said to imply an assault, consists of any kind of corporal injury, however small, designedly done to another by an actual contact with his person. The injury need not be done by the immediate hand of the party; nor is it material whether the act is wilful or not, provided it proceeds from a mischievous design. In a case where a lighted squib was thrown into a market-place, which was tossed about from hand to hand and at last

struck a man in the face and put out his eye, it was held to be an assault and battery by the first thrower.

A person who commits an assault and battery is liable to an action of trespass by the party injured, and also to a criminal prosecution for a misdemeanour and breach of the peace; but if a defendant is found guilty upon an indictment, and the court is informed that an action has been brought for the same injury, a nominal sentence is usually passed, unless the prosecutor will consent to discontinue his action.

Formerly, although a person were convicted before justices of an assault, or acquitted upon the merits, he was still liable to proceedings by action at law. But now, after a case has been heard before justices, they are required to issue a certificate to the party complained against, which gives release from all further proceedings for the same cause, whether civil or criminal, whether he be acquitted or convicted.

The punishment for common assaults is fine and imprisonment at the discretion of the court. By the 24 & 25 Vict. c. 100, persons convicted of assaulting magistrates, officers, or other persons concerned in preserving wrecks, are liable to be kept in penal servitude for seven years, or to be imprisoned, with or without hard labour, at the discretion of the court. The statute contains other provisions of a like special nature, as to assaults upon a peace or revenue officer in the execution of his duty, and the like. By the same statute a man may be convicted of an assault under an indictment of a greater offence.

Though the 33 Henry VIII. c. 12, has been repealed by the 9 Geo. IV. c. 31, and this again repealed by the above statute of Victoria, it seems that the penalty of the loss of the right hand attached by the common law to assaults committed in the actual presence of the queen or in her constructive presence in the superior courts of law, still remains.

By the 24 & 25 Vict. c. 100, s. 42, persons guilty of common assaults may be convicted summarily by two magistrates, who are empowered to impose a fine not exceeding £5, with the costs; and in case of non-payment to commit offenders to prison for two months.

In cases of "aggravated" assault the criminal may be liable to penal servitude for life; and, as in the case of common assault, regard is paid to the "intention," which constitutes the essence of the crime. Thus attempts to murder or to inflict severe bodily injury, or assault with intent to rob or to commit the crime of rape, are "aggravated" assaults, and render the offenders liable to the full penalty. The law also takes cognizance of accessories to an assault; thus, in the case of rape any person aiding, assisting, or encouraging the criminal becomes a principal in the second degree, and liable to punishment accordingly.

ASSAULT is in Scotland a punishable offence, usually prosecuted by the public prosecutors attached to the sheriffs' courts, to the police courts established by statute, and to the justice of peace courts. It is seldom brought before the supreme criminal court, unless it be of a highly criminal character; and it is then generally charged as assault with some specific aggravation, as "assault aggravated by being to the effusion of blood," or as "being to the danger of life," or "by being committed against a magistrate," or "by being perpetrated with a lethal weapon," an expression applicable to a sword, hatchet, hammer, or any instrument more formidable than an ordinary walking-stick. Criminal prosecutions for assault, at the instance of private parties, are almost unknown. The party injured may pursue for civil damages before a jury; but such prosecutions are not frequent. There is no division, as in England, into "assault" and "assault and battery." Many of the statutory regulations, as to assaults by manufacturers, &c., extended to Scotland. The later statute law on this subject, having been passed to alter laws peculiar to

England, does not in general apply to Scotland. The respective punishments of the various kinds of assault have thus, in Scotland, been in a great measure fixed by the practice of the several criminal courts.

ASSAULT, MILITARY, is a sudden and vigorous attack upon a fortress or fortified post. It is sometimes made in force against regular fortifications before siege operations have been commenced, but more generally when what is termed a practicable breach has been effected by mining or the use of artillery. The troops chosen for this desperate work are divided as a rule into the "storming parties," "support parties," and "firing or covering parties." The duty of the storming party is to effect a forcible entry into the place attacked, and they are assisted in this by the firing parties, who, extended in open order, keep firing at the defenders who appear above the parapet or into the embrasures. Where there is a ditch and wall to be surmounted, "ladder parties" are appointed to assist the storming parties by carrying and placing in position the necessary scaling ladders. The supports are the troops who keep a little in the rear until the first operations are attempted.

ASSAYE, a small town in India, 260 miles N.W. of Hyderabad. This place is principally known as having been the scene of a battle fought on the 23rd of September, 1803, between the English army, under the Duke of Wellington, then Major-general Wellesley, and the confederate armies of Dowlut Rao Scindia and the Rajah of Berar. The British army amounted to 4500, of whom 2000 were European soldiers and 2500 Sepoys. The combined forces of the enemy amounted to 50,000, and were commanded by the French general Péron. After a very severe struggle against these tremendous odds, the English gained the most complete victory that ever crowned British valour in India; and their opponents fled, leaving 1200 men dead, 98 pieces of cannon, and a large quantity of ammunition and stores.

ASSAYING, a chemical operation, which differs from analysis only in degree. When an analysis is performed the nature and proportions of all the ingredients of a substance are determined; but in assaying, the quantity of any particular metal only which the ore or mixture under examination may contain is ascertained, without reference to the substances with which it is mixed or alloyed. Assaying is sometimes conducted entirely in what is called the *dry way*, or by heat; at other times in the *wet way*, or by acids and other reagents; and in some cases both methods are necessarily resorted to.

The assaying of silver and gold is effected by a process called *cupellation*. Cupels are small flat crucibles, shown (single and quadruple) in figs. 1 and 2 of Plate, made by pressing bone ash, moistened with water, into circular steel moulds, A B C, and they are dried by exposure to the air. The principle upon which the operation depends is, that all metals with which gold and silver are usually alloyed are convertible into oxides by exposure to atmospheric air at a high temperature, whereas the precious metals remain unacted upon.

To assay silver by cupellation, the silver is flattened and wrapped up in an envelope of lead. A muffle or oven is heated in an assay furnace, and the two metals put into it. The metals melt, and the lead becomes converted into an oxide, which, as well as any baser metals before combined with the silver, is absorbed by the substance of the cupel, until at length the silver is left absolutely pure. An assay furnace, as used in the Royal Mint, is shown in fig. 3 of Plate in elevation and vertical section. It is made of wrought iron about $\frac{3}{4}$ inch thick, and lined with fire-brick. It rests on a plate of fire-clay, beneath which is an iron girder-plate, c, placed on the fire-bars, b. There are five openings in the furnace, that marked A to clear the ash-pit, b D to remove two fire-bars and permit the fuel to drop into the ash-pit, and E and F to charge the muffle and furnace respectively. The muffle is shown at m.

Very delicate balances indicating at least $\frac{1}{1000}$ th of a grain are made for assaying purposes. The most generally approved form is shown in fig. 4. The beam in this balance is 10 inches long, and usually weighs 125 grains. The scale pans rest in stirrups of palladium, and can be removed by means of forceps. Each stirrup hangs from two steel points resting in agate caps (fig. 6), and the agate knife-edge at the centre (fig. 5) does not come in contact with the agate palates until the supports have been removed from below the scale pans by the handle in front of the balance.

The assaying of gold is performed, to a certain extent, exactly in the same way as that of silver; and if the gold were alloyed only with copper, the process would be as simple as that of silver assaying. Usually, however, gold contains silver, and this cannot be got rid of by cupellation. The *parting* process is therefore had recourse to; this consists in dissolving the silver by dilute nitric acid, which leaves the gold pure. See HALL MARK.

Iron ores are chiefly of three kinds—the impure carbonate, commonly called the argillaceous iron ore; the peroxide, including the specular and hematite iron ores; and the black or magnetic ore, which is a compound of the protoxide and peroxide. The wet way is generally preferred by metallurgists for the determination of the amount of iron, zinc, copper, and antimony in the ores of these metals. The estimation of iron in an ore is performed by the aid of a standardized solution of permanganate of potash, which loses its violet colour when added to a solution of protoxide of iron. The dry method is still used by ironmasters in proportioning ingredients for the blast furnace. The process used is based upon the same principle as the reducing action in the furnace, and consists in separating the oxygen from the iron, by the greater affinity of charcoal for that element at high temperatures. The ore, some charcoal, and an alkaline flux are heated in a crucible, and the result is that all the impurities in the ore are made to leave the iron, so that the latter is presented in a purely metallic form.

Copper.—The wet assay is effected by dissolving the ore in nitric acid, and removing the sulphur, if any is present, by chlorate of potash. The nitrate of copper is then converted into chloride by addition of hydrochloric acid, and subsequent evaporation. The residue is dissolved in weak hydrochloric acid, filtered, and the copper precipitated by pure zinc or iron; this is washed quickly, dried, and weighed as pure copper. The dry assay is still in use in Cornwall, at Swansea, and some other places. A flux is prepared of fluor spar, borax, slaked lime, argol, and nitre. The ore is pounded, calcined in a crucible at a red heat, then cooled, then heated again with some of the flux until it is brought to a liquid state. The liquid metal is poured into a mould, and quenched when solid but yet hot. There is then found a portion of metal underneath a layer of coarse slag. The metal is separated from the slag, reduced to powder, and again heated until the sulphur is driven off from it. The copper is brought to a certain state of purity by this operation; and the process is repeated a second and a third time, until the copper is perfectly free from foreign ingredients. This complicated routine is followed when the ore contains many foreign bodies besides sulphur. If sulphur be the only one, the operation is much simpler; and if sulphur even be not present, the assaying is still easier.

Lead.—The principal ore of lead is the sulphide, commonly called galena; but the carbonate, or white lead ore, is sometimes found in considerable quantity. The former of these is assayed by being put into a crucible with iron and black flux and cream of tartar, all in small grains; and after being covered with a layer of salt they are heated until the lead becomes separated from all impurities. The second kind of ore is assayed in the same way, but with a different flux.

Tin.—The ores of tin are principally of two kinds—the oxide and the sulphide. The oxide is assayed by simple fusion with a flux, which removes the oxygen. The sulphide is assayed by being first pounded and calcined, to drive off any sulphur or arsenic, and then melted again with a flux of alkalis, fluor spar, and lime, by which the tin becomes separated from all the other impurities.

Zinc.—The ores of zinc are of two kinds—the carbonate or calamine, and the sulphide or blende. The carbonate is assayed by being broken into small pieces, brought to a red heat, cooled, reduced to a fine powder, mixed with powdered charcoal, and melted in a crucible, under such conditions that the zinc may leave the ore and combine with a thin layer of granulated copper so as to produce *brass*; and the quantity of the brass so produced tests the richness of the ore in zinc. The sulphide or blende is assayed nearly in the same way.

ASSEMANI, GIUSEPPE SIMONE, a learned Maronite, a native of Syria, born in 1687. He came to Rome towards the beginning of the eighteenth century, and was made archbishop in partibus of Tyre, and librarian of the Vatican, by Clement XI. He died at Rome in 1768.

ASSEMBLY, GENERAL, OF SCOTLAND. See GENERAL ASSEMBLY.

ASSENT, ROYAL. When a bill has passed through all its stages in both Houses of Parliament, if it is a money bill, it is sent back to the House of Commons, in which it had of course originated; but if not a bill of supply, it remains in the custody of the clerk of the enrolments in the House of Lords. The royal assent is always given in the House of Lords, but the Commons are also present at the bar, to which they are summoned by the Black Rod. The queen may either be present in person, or may signify her assent by letters patent under the great seal, signed with her hand, and communicated to the two houses by commissioners. Power to do this is given by 33 Henry VIII. c. 21. The commissioners are usually three or four of the great officers of state. The royal assent is rarely given in person, except at the end of a session; but bills for making provision for the honour and dignity of the crown, such as settling the civil list, have generally been assented to by the queen in person immediately after they have passed both houses. The bills that have been left in the House of Lords lie on the table; the bills of supply are brought up from the Commons by the Speaker. The royal assent to each bill, when given in person, is announced by the clerk of the parliament. After the title of the bills is read by the clerk of the crown, the clerk of the parliament says, if it is a bill of supply, which receives the royal assent before all other bills, "Le roi (or la reine) remercie ses bons sujets, accepte leur benevolence, et ainsi le veut;" if any other public bill, "Le roi (or la reine) le veut;" if a private bill, "Soit fait comme il est désiré."

When the royal assent is refused to a bill, the form of announcement is "Le roi s'avisera." There has been no instance of the rejection by the crown of any bill, certainly not of any public bill which had passed through parliament, for many years. It is commonly stated that the last instance was the rejection of the bill for triennial parliaments by William III. in 1693. But another instance of the rejection of a bill occurred towards the end of the same year, the rejection of the bill commonly called the Place Bill, the object of which was to exclude holders of offices of trust and profit under the crown from the House of Commons. It was presented to the king with the Land-tax Bill, and he assented to the one and rejected the other.

Mr. Hatsell, in the second volume of his "Precedents," states that the latest instance which he discovered was the rejection of a Scotch militia bill by Queen Anne in 1707; and this is also the latest mentioned by Sir Erskine May. In former times the refusal of the royal assent was a common

occurrence. Queen Elizabeth once rejected forty-eight out of ninety-one bills which were presented to her.

The royal assent makes a bill an act of parliament, or a law. As by a legal fiction the laws passed during a session of parliament are considered only one statute (of which what are popularly called the separate acts are only so many chapters), it used to be a matter of doubt whether the royal assent, at whatever time in the session it might be given, did not make the act operative from the beginning of the session, when no day was mentioned in the body of it as that on which it should come into effect. To settle this point, it was ordered by 33 Geo. III. c. 13, that the clerk of parliament should for the future endorse on every bill the day on which it received the royal assent, and that from that day, if there was nothing in it to the contrary, its operation should commence.

During the Commonwealth an English form was substituted for those in Norman-French which had been previously and are now in use. On the 1st of October, 1656, the House of Commons resolved "that when the Lord Protector shall pass a bill, the form of words to be used shall be these, 'The Lord Protector doth consent.'" In 1706 also a bill passed the House of Lords, and was read a second time in the House of Commons (but was finally rejected there), for abolishing the use of the French tongue in all proceedings in parliament and courts of justice, including the royal assent.

(Hatsell's "Precedents," especially vol. ii. pp. 338-351; May's "Treatise upon the Law, Privileges, Proceedings, and Usage of Parliament.")

ASSES'SOR. The word assessor is Latin (*adversor*), and signifies one who sits by the side of another. An assessor under the Romans was one who was learned in the law, and sat by a magistrate or other functionary, such as the governor of a province (*Præses*), to aid him in the discharge of the judicial duties of his office. The assessor did not pronounce a sentence; this was done by the magistrate or person who presided.

Two assessors are elected by the burgesses in all municipal boroughs, annually. The qualifications are the same as those of a councillor; but actual members of the council, the town-clerk, and treasurer are ineligible. In corporate towns divided into wards two assessors are elected for each ward. The duty of the assessors is to revise the burgess lists in conjunction with the mayor, to be present at the election of councillors, and to ascertain the result of elections. The word assessor is not usually applied in this country to those whose duty it is to assess the value of property for local or public taxation. This is usually done by a "surveyor." There are also assessors under the County Court Acts. Under the Judicature Act of 1875 provision is made for trial of matters of fact by the judge, with assessors, instead of by jury, when parties so desire.

ASSESSOR. In Scotland the magistrates of corporate burghs who exercise judicial powers generally employ some professional lawyer to act as their assessor. It is his duty to see that the proper judicial control is exercised over the preparation of the pleadings, and to make out drafts of the judgments.

ASSETS (from the Norman-French *assetz*, sufficient) is the real and personal property composing an estate. Assets of a deceased person are either *personal* or *real*. Personal assets comprehend goods, chattels, debts, and devolve on the executor or administrator; and assets (including all real estate) descend to the heir at-law, or are devised to the devisee of the testator.

The term is also largely used in mercantile affairs in contradistinction to debts and liabilities. In the balance sheets issued by banks, insurance companies, financial associations, &c., the liabilities are placed on one side and the assets on the other. In cases of bankruptcy and insol-

veney it is used to designate the whole of the property available for the payment of the creditors, as assets. It is not a technical term in Scotch law, but it is freely used in Scotland, both in legal business and in mercantile affairs, in the same sense as in England.

ASSIDIANS or **CHASIDIM** was a name given to the zealous defenders of the unity of the Deity and the belief of their ancestors, against the attempts of Antiochus Epiphanes and his successors to force the Jews into idolatry. Mattathias headed the Chasidim during four years against the Græco-maniacs of those days. These four years are not included by Josephus in the 126 years of the ASMONÆAN dynasty, which he commences from the time at which Judas Maccabæus assumed the chief command.

Later Jews called those persons Chasidim (Pietists) who secluded themselves from worldly occupations. These Chasidim studied the Kabbala, and endeavoured by their mortification of the flesh to abstract the spirit from the body, and thus have liberty to enter into communion with God and angels. They fasted frequently, and asserted that they had visions. The Pharisees were an outcome of the Chasidim.

About 1750 a fresh life was breathed into the remnants of this sect by Israel Baal-Shem (Lord of the Name), who pretended to work miracles by the secret name of God; and the Chasidim became very numerous. After his death, in 1760, they again died down, and now are only represented by a few isolated bodies of no importance, with a very varying ritual peculiar to themselves.

ASSIENTO TO TREATY, in Spanish, *El Asiento de los Negros*, that is, the compact for the farming or supply of negroes. Such treaties were made first with Portugal, and afterwards with France, each of which countries, in consideration of enjoying a monopoly of the supply of negroes to the North American dominions of Spain, agreed to pay to that crown a certain sum for each negro imported. In both cases the Asiento was taken by a commercial association, and both the Portuguese company and the French were ruined by their contract. At the peace of Utrecht, in 1713, the Asiento, which the French had held since 1702, was transferred to the English for a period of thirty years, and taken up by our notorious South Sea Company. The war which broke out in 1739 stopped the further performance of this contract; and at the peace of Aix-la-Chapelle, in 1748, the claim of England to the remainder of the privilege was allowed. Eventually, however, England accepted £100,000 for the unexpired four years. Spain indeed complained that the greatest frauds had been committed under that provision of the treaty, which allowed the contractors to send a shipload of goods every year to South America. It was alleged that the single ship was made the means of introducing into the American markets a quantity of goods amounting to several times her own cargo.

AS'SIGNAT. One of the earliest financial measures of the Constituent Assembly, in the French Revolution, was to appropriate the landed property of the clergy to national purposes. Shortly afterwards the Assembly decreed the sale of lands belonging to the crown and the clergy to the amount of 400,000,000 francs, or about £16,000,000 sterling. It was first proposed that the lands should be transferred to the municipalities, which might give the state a security for the price, and the state would pay its creditors with these securities, which could be realized according as the municipalities were able to sell at an advantageous price the lands thus made over to them. The holders of the securities would have a legal claim on the municipal bodies, and might, moreover, buy the lands when put up to sale, and offer the security in payment. But it might happen that the holder of such securities would be unable to realize them, and might not be willing to purchase any of the lands of the state; and to obviate this objection to

the securities it was proposed that they should be transferable and be made a legal tender. Under these circumstances it was determined to issue a paper-money, based on the security of the unsold lands belonging to the state. The notes thus issued (each of which was for 100 francs, equal to £4) were called *assignats*, as representing land which might be transferred or *assigned* to the holder; and all notes which came back in this manner to the government in payment for national lands were to be cancelled. They bore an interest by the day, like English exchequer bills. The object of this measure was to obtain the full value of the confiscated lands (which in the actual state of France was impossible), and to supply the deficiency of coin in the circulation (arising from a feeling of insecurity) by a forced issue of inconvertible paper-money. The first issue of assignats was to the number of 400,000,000, bearing interest; shortly afterwards 800,000,000 in addition were issued, but without the liability to pay interest, and containing also assignats of very small amounts. The last of these two issues was made in September, 1790. In the beginning of the following year the Legislative Assembly sequestered for the benefit of the state the property of all the emigrants; and in September, 1792, although 2,500,000,000 had been already issued, a fresh issue of 200,000,000 was ordered by the Convention. Towards the end of this year the double effects of the general insecurity of property and person, and of the depreciation of assignats caused by their over-issue, was felt in the high price of corn and the unwillingness of the farmers to supply the markets with provisions. Prices still continued to rise; and although corn and other necessities of life were to be had, their value, as represented in the depreciated paper currency, had been nearly doubled, but the wages of labour had not risen in a corresponding degree. Great distress, clamours for a fixed maximum of prices, and pillage of the shops were the consequence.

This method of providing for the wants of the government, however, appeared so easy that it was had recourse to repeatedly during the next few years, until ultimately over 45,000,000,000 francs had been put into circulation. Every effort was made to enforce the general acceptance of these notes, and the most stringent and iniquitous laws were passed for that purpose; but all proved vain, and the assignats continued rapidly to decline in value. In June, 1793, one franc in silver was worth three francs in paper; in August it was worth six. Towards the end of that year a recovery in value took place, but it was of short duration, and the assignats sunk lower and lower, until in March, 1796, the gold piece of twenty-four francs was worth 7200 francs in paper. Before this, however, it had become evident that some new financial expedient was necessary.

It was therefore determined to make a new issue of paper, under the name of *mandats*, to the amount of 2,400,000,000. Of this sum 800,000,000 were to be employed in extinguishing 21,000,000,000 assignats, which were to be taken at a thirtieth part of their legal value; 600,000,000 were to be allotted to the public service; and the other 1,000,000,000 retained in the public coffers. These mandates were to enable any person who was willing to pay the estimated value of any of the national lands to enter into possession; and therefore they furnished a somewhat better security than the assignats, as these could only be offered in payment at sales by auction; and consequently the price of the lands rose in proportion to the depreciation of the paper. The mandat of 100 francs, at its first issue, was worth fifteen francs in silver; and the new paper was soon so much discredited that it never got into general circulation, and was not able to drive out the coined money, which was now almost universally employed in transactions between individuals. The only holders of mandates were speculators, who took them from the government and sold them to purchasers of national lands. The government

was soon forced to abandon the mandates, as they had abandoned the assignats, and to declare that they should be received in payment of taxes and national lands only at their real value. Having fallen to nearly a seventieth of their ostensible value, they were, in the course of 1796, returned to the government in payment of taxes and for the purchase of lands; and with them ended the revolutionary system of paper-money, which had been so obstinately persisted in by the government, and which produced more misery than can be calculated.

The assignats were indifferently designed, and printed upon a coarse inferior paper, and large quantities of forged notes were manufactured abroad and smuggled into France during the period in which they were in circulation.

After the extinction of the mandates the legal currency of France was for a long period exclusively metallic, but notes of different amounts are now allowed to be issued by the Bank of France to a limited extent.

(Thiers, vol. viii. pp. 85-89, 103-119, 158-162, 177, 183-191, 334-344, 423, 424; Storch, "Cours d'Econ. Pol." vol. iv. p. 161.)

ASSIGNATION. See ASSIGNMENT (Scotland).

ASSIGNEE (of a lease) is the party to whom the whole interest of the lessee in lands is transferred by assignment, which assignment may be made without the privity or consent of the lessor, unless the lessee is restrained by the lease from assigning over. The assignee becomes liable to the lessor, from the date of the assignment, for the payment of the rent and performance of the covenants in the lease; but such liability is limited to breaches of covenant during the existence of the assignee's interest, and may be got rid of by assigning over all his interest, even to an insolvent. The assignee may acquire his interest by operation of law, as well as by an actual assignment from the lessee, and therefore a tenant by *elegerit*, who has purchased a lease under an execution, is liable as assignee to the lessor. See LEASE.

ASSIGNEE (Scotland). In the long leases peculiar to the agricultural system of Scotland the law affecting the right of transference to assignees has been held to be of peculiar importance. In an agricultural lease of ordinary length assignees are excluded without stipulation; a lease beyond the ordinary length may be assigned where there is no stipulation to the contrary. It is usual to divide such leases into periods of nineteen or twenty-one years, a lease of one such period being considered an ordinary lease, and a lease of two or more such periods being an improving lease, and in its nature assignable. A lease specially excluding assignees cannot be conducted for the benefit of the lessee's creditors if he should become bankrupt, unless under the administration of the lessee himself. In leases of houses, gardens, or other premises not let for agricultural purposes, the right to assign is assumed, if not excepted by stipulation. But where the lease is for a particular purpose, the lessee cannot assign it for a totally different purpose; thus one who became tenant of a shop as a silk-mercier was not allowed to assign his lease to an exhibitor of wax figures.

ASSIGNMENT, a deed or instrument of transfer, the operative words of which are to "assign, transfer, and set over," and which transfers both real and personal property. Estates for life and estates for years are the principal interests in land which are passed by an assignment; and by the statute of Frauds and Perjuries (29 Charles II.) the assignment of such estates is required to be in writing. An assignment differs from a lease, in being a transfer of the entire interests of the lessor; whereas a lease is an estate for years taken out of a greater estate, creates the relation of landlord and tenant, and reserves to the lessor a reversion. In all under-leases, therefore, it is necessary that part of the original term should remain in the lessor; a day is sufficient.

An assignment of goods, chattels, &c., in possession,

is frequently made by bill of sale. [See BILL OF SALE.] With respect to *things in action*, *choses in action* (as debts, for instance), they are not, with some exceptions, assignable at common law. Thus, if the obligee in a bond assign over the bond to a third party, the assignee cannot sue on the bond at common law in his own name; but such an assignment generally contains (and ought always to do so) a power of attorney from the obligee to the assignee, to sue in the obligee's name. Courts of equity regard the assignee, for valuable consideration, as the actual owner of the bond; and the courts of common law so far recognize the right of the assignee, that if the obligor, after notice of the assignment, pay the money on the bond to the obligee, the courts will not permit him to plead such payment to an action brought by the assignee in the obligee's name on the bond.

ASSIGNMENT IN SCOTLAND. The term assignment is in colloquial use in Scotland, but the word which supplies its place in legal nomenclature is *assignment*. In some instances, however, where statutes employing the phraseology of the English law have been extended to Scotland, the word assignment has necessarily obtained a partial technical use, as in the transference of property in copyright, patents, and registered vessels. The definition of an assignment, as distinguished from any other species of conveyance, is, that it conveys not a thing, but a title to a thing. Thus a bill of exchange comes within the character of an assignment, because it is, or professes to be, a conveyance in favour of the payee of a right in the person of the drawer to a sum due to him by the drawee. There is no rule known in the law of Scotland equivalent to that which affects the assignment of a chose in action in England; and, except in certain cases, a right exigible by one person is capable of being made over by assignment to another.

Assignations are of great importance in the conveyance of heritable or real property. The old system of subinfeudation being still in operation in Scotland, a proprietor of heritable subjects, whose right is indisputable, is frequently not in the position of having received feudal investiture from his superior. He is said in such a case to have a mere personal right, as holding in his hands the authority for making his title real by investiture. This authority he transfers by assignation, and property is thus frequently passed through several hands by assignation before it is found expedient or necessary to complete the investiture. In conveyances of landed property, such title-deeds as the party conveying has agreed to give to the party receiving are transferred by assignation. For assignations to leases see ASSIGNER (Scotland).

As the transfer of movable property is completed by delivery, the person who has the possession cannot convey (as in the case of land) his right to the thing as separate from the thing itself, and thus an assignation affecting movable property can only take place when it is in the hands of a third party. The simple act of assignation may be effectual in all questions between the cedent and the assignee, but to make the third party who holds the property in his hands responsible, as holding it for the latter and not for the former, the further ceremony of a formal intimation is necessary; and until such intimation be made the cedent's creditors may attach the property in the hands of the holder. Presentment is the proper form of intimation in the case of a bill of exchange. In its most formal shape, an intimation of an assignation is made by the reading of the document to the debtor in presence of a notary and witnesses; and the evidence of the ceremony is the notarial; but, in the general case, other circumstances which put the fact of intimation beyond doubt, such as the debtor's admission of his liability to the assignee, are held as equivalents.

ASSIMILATION is the term used in physiology to express the incipient *vitalization* of materials which were previously in the condition of mere chemical compounds, by

means of the organs of the body. The coagulation of fibrin, for instance [see BLOOD], is a *vital* phenomenon, and can be clearly shown to arise from no mere physical nor chemical change; it is indeed a rearrangement of particles preparatory to the making of a living tissue, and if it occurred in the body would really result in the formation of tissue. No substance is known to behave in this manner without having been *assimilated* by a living body. Growth is therefore simply the continuation or outcome of assimilation.

A solution of dextrin or starch-gum is identical in chemical composition with CELLULOSE, but it is unable to form vegetable tissue until it has combined with albuminous matter to form living PROTOPLASM. In like manner, the albumen of animals does not seem capable of forming tissue till it has first been converted into the blastema so plentifully poured forth to repair the skin if it is injured. In both cases there may be some chemical modification of the ultimate elements, but this is quite insufficient to account for the marked difference, between the organizable and non-organizable fluids, which assimilation produces.

ASSISI, an episcopal town of Central Italy, about 13 miles S.E. from Perugia. It was the birthplace of St. Francis, the founder of the mendicant order of Franciscan friars, of which it is considered the metropolis. The Sacro Convento, or church and monastery in which St. Francis was buried, is a large and splendid building. After having existed for more than six centuries, the monastery was suppressed in 1866. Part of the building is used as a school for the sons of teachers. The church contains some fine frescoes by Giotto and some paintings by Cimabue. Two miles from Assisi, by the side of the high road, is the magnificent church of Santa Maria degli Angeli, on the site of the oratory where St. Francis first began his ascetic course of life. It was begun by Vignola in 1569. The nave and choir were re-erected after an earthquake in 1832; the dome had escaped injury. The interior below the dome contains the oratory of the saint. *Assisium* was a Roman municipium, and a place of considerable importance, as may be inferred from the remains of the forum, theatre, aqueducts, and other ruins which are still seen. But the finest piece of antiquity which it contains is the Temple of Minerva, now transformed into a church dedicated to the Virgin; the portico, which has remained entire and in good preservation, is considered to be the finest specimen of the kind in Italy, next to the Pantheon. Assisi has been the see of a bishop since A.D. 240. In the last century it was much resorted to by pilgrims visiting the tomb of the saint. The poet Pietro Metastasio was born here. The population of Assisi in 1881 was 15,000.

ASSIZE. This word has been introduced into our legal language from the French *assise*, and is ultimately derived from the Latin verb *assideo*, to sit by. It has various significations.

1. Assize signified a code of laws made immediately by the king. Thus the assizes of Jerusalem were a code of feudal laws for the new kingdom of Jerusalem, formed in 1099, by an assembly of the Latin barons and of the clergy and laity, under Godfrey of Bouillon (Gibbon's "Decline and Fall," vol. xi. p. 93). The successive assizes of Henry II. were a series of reforms which carried out the system of his grandfather, Henry I., and substituted English law for Norman despotism. The *Assize of Clarendon* (1166), not to be confounded with the Constitutions (or Concordat, as we should call it) of Clarendon, held two years before, revived the old frank-pledge or mutual responsibility of Saxon times, and incidentally, for providing for the repression of crime, instituted trial by jury. The *Assize of Northampton* (1176) divided the country into circuits, which exist in their main outlines to the present day. Henry's object in this was financial mainly, though the judicial uses, which have preserved the circuits to our time, were not absent from his mind. Finally, the *Assize*

of Arms (1181) restored the national militia to the place which it had lost at the Conquest (see Professor Green's "Short History of the English People").

2. There were the assizes or ordinances regulating the price of bread, ale, fuel, and other common necessities of life, called in Latin *assise venalium*. The earliest express notice of any regulation of this kind in England is in the reign of King John (1203), when a proclamation was made throughout the kingdom enforcing the observance of the legal assize of bread. Many statutes were passed regulating the assize of articles of common consumption; the earliest of these is the assize of bread and ale ("assisa panis et cervisie"), commonly called the statute of 51 Henry III., though its precise date is doubtful. The statute 8 Anne, c. 19, repealed the 51 Henry III., and imposed a new assize of bread, and made various other regulations respecting it. Several subsequent Acts have been passed on the subject, but by the 55 Geo. III. c. 99, the practice was expressly abolished in London and its neighbourhood, and in other places it has fallen into disuse.

3. The word assize also denoted the peculiar kind of jury by whom the writ of right was formerly tried, who were called the grand assize. The 3 & 4 Will. IV. c. 27, abolished this mode of trial. By the law of Scotland the jury, in criminal cases, are still technically called the assize, though popularly known as the jury. See JURY.

4. The common use of the term assize at the present day is to denote the sessions of the judges of the Supreme Court, held periodically in each county, when prisoners are tried and civil suits determined. These assemblies no doubt originally derived their denomination from the business which was at first exclusively imposed upon them, namely, the trial of writs of assize. According to the common law, assizes could not be taken (i.e. writs of assize could only be tried) by the judges sitting in term at Westminster. To remedy this grievance, it was provided by Magna Charta, in 1215, that the judges should visit each county to take assizes. From this provision the name of justices of assize was derived, and by several later acts of parliament various authorities were given to them by that denomination. By the 13 Edward I. c. 3 (commonly called the Statute of Westminster 2), authority was given to the judges of assize to determine inquisitions of trespass and other pleas pleaded in the courts of King's Bench and Common Pleas; and thus their jurisdiction to try civil causes, other than the writs of assize above mentioned, originally arose. Besides the general authority to determine civil issues, it was provided by the Statute of Westminster 2, that no inquest in a civil action should be taken by the judges of the superior courts when sitting at Westminster, unless the writ which summoned the jury for such inquest appointed a certain day and place for hearing the parties in the county where the cause of action arose. Thus, if a suit arose in Cornwall, the writ from the superior court must direct the sheriff of that county to return a jury at Westminster for the trial of the inquest in the next term, *unless before (nisi prius)* the term, namely, on a certain day specified in the writ, the justices of assize came into Cornwall. This was sure to happen under the directions of a previous clause in the Statute of Westminster in the course of the vacation before the ensuing term, and the jury were then summoned before the justices of assize in Cornwall, where the trial took place, and the parties avoided all the trouble and expense of conveying their witnesses and juries to London. Since the passing of 1 Will. IV. c. 70, the assizes throughout the whole of England and Wales (excepting London and the parts adjoining) have been held twice a year in each county upon a uniform system; and a third, or winter assize, is held for the trial of criminal cases only. See CIRCUITS.

The judges upon the several circuits derive their civil jurisdiction ultimately from the ancient statutes of assize

and *nisi prius*; but they have also a commission of assize which is issued for each circuit by the crown under the great seal. This commission seems to have been nearly in the same form ever since the passing of the Magna Charta and the statutes of *nisi prius*.

In certain cases the justices of assize, as such, have by a statute a criminal jurisdiction; but the most important part of their criminal authority is derived from other commissions. The first of these is a general commission of oyer and terminer for each circuit. See OYER AND TERMINER.

The judges of assize have also commissions of gaol delivery. See GAOL DELIVERY.

In addition to the above authorities, the judges on the circuits are also in the commission of the peace. The judges of the Supreme Court are always inserted in the commissions of the peace periodically issued for each English county; and consequently they may exercise all the powers and functions communicated by the commissions of the particular counties which compose their respective circuits.

In practice, the judges choose their circuits by arrangement among themselves on each separate occasion. They are then formally appointed by the crown under the sign manual; and the several commissions are afterwards made out in the crown office of the High Court, from a fiat of the lord chancellor.

The Judicature Act of 1875 made but trifling alteration in the assize procedure. The most important benefit of the Act was to insure such proper discharge of judicial business that no arrears should stand over from year to year. But such a serious inconvenience to suitors as this is unknown to country districts. The "judges of the courts at Westminster," as they were formerly called, went round the country on circuit, and at Liverpool, York, or whatever town they held sittings of assize, they were (and are now) bound to stay and finish the causes entered for trial; while in the metropolis, at every sittings, they left hundreds of causes untold, to the untold injury and frequent ruin of suitors. When it is mentioned that the number of the causes tried in the metropolis is about half the total number tried throughout the country, some notion may be formed of the magnitude of the evil. It was not, moreover, an evil affecting only suitors in the metropolis, for a large portion of the causes are brought from the country to escape the still greater evil of the hurry and haste of the assizes, and thus the evil affected suitors at large in every part of the country. The Judicature Act of 1875 consolidated the various superior courts, gave uniform jurisdiction to the judges, and provided for the same advantages, as regarded regular despatch of business, being enjoyed in the metropolis as is, and always has been, possessed in the country assizes.

ASSOCIATION OF IDEAS. The office which association performs is to connect and arrange ideas, to regulate the succession of the thoughts. When one thought is suggested by another, or when a train of past images is summoned by something present, whether spontaneously or by an exertion of memory, the process by which this effort is made is called association. Locke, in one of the later editions of his "Essay on the Human Understanding," added a new chapter, entitled, "Of the Association of Ideas," in which the laws of this power are noticed, and some of its phenomena explained. Soon after, Hartley, in his "Observations on Man," investigated the principle more thoroughly, carried its application from simple ideas to the actions and affections, and traced all the intellectual and moral phenomena to this source. He states the law of association thus:—Any associations, A, B, C, &c., by being associated with one another a sufficient number of times, get such a power over the corresponding ideas, A, B, C, &c., that any one of the sensations, A, when impressed alone,

shall be able to excite in the mind, B, C, &c., the ideas of the rest." Hume, in one of his Essays, published almost contemporaneously, traced the influence of our associations to certain principles, which he denominated "resemblance, contiguity in time or place, and cause or effect." "That these principles," he observes, "serve to connect ideas will not, I believe, be much doubted. A picture naturally leads our thoughts to the original. The mention of one apartment in a building naturally introduces an inquiry or discourse concerning the others. And if we think of a wound, we can scarce forbear reflecting on the pain which follows it."

James Mill attempted to reduce the principles of causality and resemblance under contiguity. He considered the causes of association to be two in number, the vivacity of the associated sentiments, and the frequency of the association. Association takes place not only between simple but between complex ideas, which melt together so as to form an idea which appears simple. Such are our ideas of most familiar objects; the idea of a wall is a complex idea resulting from the already complex idea of bricks and lime. John Stuart Mill reduces the fundamental idea of cause to an inseparable and unconditional association, and on cause he founds the entire theory of reasoning. Psychology, he thinks, ought to be able to explain the most complex phenomena by means of the laws of association. But its task is rendered very difficult, because the combined action of different causes sometimes produces combinations, in which it is difficult to find the constituent elements. The effect may present the case of mechanical laws, where each cause is to be found in the effect, as if it had acted singly. The idea we have, for instance, of an orange, is a result of certain sensations of taste, colour, smell, &c., and these sensations can each be perceived separately. But if we think of the colour *white*, we have in our minds a very different notion from a mere aggregate of the colours of the rainbow. Here the mental combination reminds us of a chemical compound, in which there is no resemblance to any one of the constituents. Bain shows that the different processes of the mind, the faculties of judgment, reasoning, abstraction, perception, imagination, are different forms of the one law of association. *Simple association* may be a case of the law of contiguity: actions, sensations, and states of feeling occurring together, or in close succession, tend to grow together in such a way that when either of them is afterwards presented to the mind, the others are apt to be brought up in idea. Or it may fall under the law of resemblance: *present* actions, sensations, thoughts, or emotions tend to revive their *like* among previously occurring states; as when a portrait brings up the original. Professor Bain shows how *contiguity* explains such actions as walking, or playing upon a musical instrument, which are aggregates of separate movements, at first performed slowly and with difficulty, but gradually cohering together, so that one movement of the series instantly brings on the next. The various modes of reasoning and scientific processes, *e.g.* classification, are founded upon association by resemblance. Associations, separately too weak, may conjointly be strong enough to revive a past experience, and thus we have a *compound association*. For instance, we perceive the odour of a liquid; this sensation alone does not suffice to recall its name, but we afterwards taste it, and remembrance is effected by these united sensations. By means of association the mind has the power to form combinations, or aggregates, different from anything actually experienced. This *constructive association* includes such processes of the mind as imagination, invention, and may also be traced in combining movements into new groupings, *e.g.* in gymnastic exercises, elocution, &c.

ASSONANCE, one of the most delicate forms of rhyme ever invented. In the article ALLITERATION we gave an account of an ornament still much used (and sometimes much abused) in our literature—the frequent recurrence of

words beginning with the same letter, generally with the same consonant, as being more marked. Thus Shakespeare, ridiculing the fashion of the writers of his day, puts these burlesque lines into the mouth of the clown in "Midsummer Night's Dream"—

"Whereat with blade, with bloody, blameful blade,
He bravely broached his boiling bloody breast."

The converse of this coarse contrivance for gaining force is what Icelandic poets call *half-rhyme*, an elegant device of which their poetry is full, and which consists in the use of words ending with the same consonant, as *bad, led; sin, run*. Of this and *line rhyme*—that is, two rhyming syllables occurring, not as with us, at the end of two lines, but both together in one line—Icelandic poems are chiefly made. Terminal rhyme is but rarely used in comparison.

But finely felt as are these ancient forms of rhyme compared with our jingling rhyme-endings, they must yield the palm as a subtle and ethereal medium for rhyme to *assonance*, an element almost peculiar to Spain and Portugal. Assonance consists in using the same vowel with different consonants, and is therefore the converse of alliteration and of half-rhyme. The eminent German poet, Fr. Schlegel, was so struck with its elegance that he used it in his tragedy "Alfros," but this is almost the only foreign instance of any importance. In this sense, therefore, *man* rhymes to *hat*; *nation* rhymes doubly to *traitor*; *penitent* rhymes triply to *reliefence*. Professor Marsh, in his valuable "Lectures on the English Language," gives a specimen of a poem in assonant-rhyme, from which we select two stanzas, to show the exquisite delicacy of the rhyme-scheme—

"There beneath transparent *skies*,
Where the vine and olive *thrive*,
Where the golden orange *smiles*—
Listening to the *wave*,

"There how gladly would I *sleep*,
Ocean's music in mine *ear*,
Through the night of time, nor *feel*
Weary till the *day*."

ASSOUAN (the *Syene* of the Greeks), a town in Upper Egypt, on the right bank of the Nile, near the last cataracts, is best known for its quarries of a kind of granite called (from Syene) *syenite*. In the quarries there are still the remains of partially-cut blocks and numerous inscriptions, which served to indicate what material had been quarried and removed, and by the order of what king. The population is about 4000.

ASSUMPTION OF THE VIRGIN MARY, FEAST OF THE, is observed in the Roman Catholic Church on the 15th of August. In the seventh century the idea originated that the Virgin had been taken to heaven in a corporeal form, body and spirit, by Christ and his angels, on the above day, A.D. 45, in the seventy-fifth year of her age. The day of her death had been observed in the church from the fourth century.

The Assumption was a favourite subject amongst the great Italian painters. That by Titian, at Venice, is admittedly one of the finest productions of art in all time. The Virgin, as represented by the great Venetian, is by no means at the advanced age of seventy-five years.

ASSURE'ANCE. See ANNUITIES, INSURANCE.

AS'SYNT. See SUTHERLANDSHIRE.

ASSYR'IA, an ancient empire in western Asia, supposed to derive its name from Asshur, the son of Shem. Greek and Roman historians commonly employ the name *Assyria* as a general designation for Babylonia, Mesopotamia, Aturia, and Adiabene; but they frequently make it comprehend part of Asia Minor. The Greeks were accustomed to use the name Syria and Syrians in a vague sense. Herodotus applies the term Syrians to the Cappadocians (i. 6, and i. 72), and he remarks that the Assyrians in the

army of Xerxes were by the Greeks called Syrians, while the Eastern nations named them Assyrians (vii. 63).

Ptolemy (vi. 1) and the Roman historians confine the name Assyria to the country east of Mesopotamia and the Tigris, which is separated on the north by the Niphates Mountains from Armenia, and on the east by the chain of the Zagros from Media; Susiana and Babylonia constitute its southern frontiers. This portion of the ancient Assyrian empire comprehends part of the modern Kurdistan. The country is divided into three parts by two rivers which rise in the Zagros Mountains, and, after traversing Kurdistan, fall into the Tigris. The first is the Lycus, the Zabatus of Xenophon, and the modern Greater Zab (Xen. "Anab." ii. c. 5). The second river, the Caprus, is also named Zabab, or Anzabab, by the later Greek and Roman writers. The country to the north-west of the Lycus, or Zabatus, is by the ancients called Aturia; that to the south-east of that river, as far as the Caprus, is named Adiabene; to the south of the Caprus we find the province of Apolloniatis, further to the east Chalontis, and Sittacene towards the confines of Susiana. The Arabian name of Adiabene is Zawabiah, which, like the term Adiabene, is a derivation of the word Zab. The name Aturia, as is observed by Dion Cassius (lxxiii. c. 28), is a mere dialectic variety of pronunciation instead of Assyria. After the dissolution of the Assyrian monarchy through the revolt of the Medes, the name Assyria was again restricted to this northern province, while the southern parts were designated either Babylonia, from the name of the principal town, or Chaldea, from the name of its inhabitants. Through the conquest of Cyrus both parts were reunited, and formed one of the most important satrapies of the Persian empire, which was sometimes named Babylonia and sometimes Assyria. This apparent confusion of the names Babylonia and Assyria is observable even in the later history of these regions, during the wars between the Romans and Parthians. The ancient capital was Ninus. See NINEVEH.

Much valuable and interesting light has been shed on the chronology, literature, antiquities, and civilization of Assyria by M. Botta, Sir H. Layard, Mr. Loftus, Sir H. Rawlinson, Mr. George Smith, and Mr. Rassam. The magnificent Assyrian sculptures, familiar to visitors of the British Museum, all of which were brought to light after having lain buried for thousands of years, were found to be more or less enriched with inscriptions, mostly of the cuneiform character. Accordingly, to have anything like a proper idea of what these and other sculptured objects meant, it was essential to have a key to the cuneiform alphabet. The characters were not Hebrew, nor Arabic, nor Greek; the component parts of the letters having a shape which has been variously compared to a wedge, a nail, or an arrowhead—the term cuneiform being from the Latin *cuneus*, a wedge. The labours of Grotefend, who was the first to decipher the inscriptions, were zealously supplemented by Rawlinson and others. A serious obstacle was overcome when it was found that the cuneiform characters were employed in three different languages, Persian, Sythic, and Assyrian; and the discoveries which resulted threw a flood of light on the history, law, and the social condition of the most ancient nations in the world. See CUNEIFORM CHARACTERS; BABYLONIA.

The researches of Mr. George Smith, of the British Museum, showed that the Assyrian sculptures and slabs in that institution furnished a number of remarkably interesting additions to Biblical history, more especially as concerned a deluge, which may be identified with that of Noah. Important links were missing, but an expedition by Mr. Smith, in 1873, to the ruins of Nineveh and Nimroud, resulted in the finding of further inscriptions which fully completed the narrative. Another expedition, in 1874, yielded fresh discoveries of increasing interest, including a tablet bearing a succinct account of the conquest of Baby-

lonia by the Elamites, 2280 B.C.—being just 4154 years previously. The very valuable results of his two expeditions, with their bearing on the history of ancient Assyria, were published by Mr. Smith in his "Assyrian Discoveries" in 1875. In the following year, 1876, he again returned to the scene of his interesting archaeological labours; but his death took place at Aleppo, 19th August, 1876. The objects collected by him—some thousands in number, and including many of considerable interest and importance—were brought to this country and placed in the British Museum in 1877. The authorities of the Museum commissioned Mr. Rassam to continue the work, who made many further discoveries. An excellent work of reference on the subject of this article is "Babylonian Literature," by the Rev. A. H. Sayce (London, 1879).

ASTACUS. See CRAYFISH, LOUSTIE.

ASTAR'TE (the Ashtoreth of the Hebrews), the Phœnician moon-goddess, and goddess of love. The worship of Astarte was in early times most widespread, because the Phœnicians, the great traders and travellers of antiquity, carried with them into distant lands the worship of their national goddess. In this manner the Greek *APHRODITE* took on many characters properly belonging to the Astarte of the Phœnicians, even to the function of protecting commerce. This confusion of the two deities accounts for the double account of the birth of Aphrodite, and for much else that would be otherwise perplexing in the Greek myth. The facts of so many myths of Aphrodite being Oriental (as that of *ANAKIS*), and of her worship being chiefly in places which had been of old Phœnician colonies, such as Cyprus, Cythera, &c., assist this explanation. The attributes of Astarte are almost identical with those of the Greek goddess. It was from the Oriental licentiousness accompanying the worship of Astarte that the cult of Aphrodite derived its grosser features. The image of Astarte in Paphos was really no image at all, but a shapeless mass of white stone, somewhat conical; the later figures were in the form of a white cow, no doubt on account of the horns being like the crescent moon in shape and the colour imitating its pallor. [See *IO*, *ARGUS*, *APHRODITE*.] Later still, under Greek influence, the goddess was represented in human form.

ASTARTE, a genus of bivalve molluscs, with two muscular impressions, and a simple mantle-line. There are two teeth in each valve; the anterior tooth of the right valve is large and thick. Like many other Arctic sea-shells, astarte has a thick olive-coloured outer coat of animal matter. Twenty living species are known, mostly Arctic, but some pass down as far south as the Canaries. They are found at a depth which ranges from near the surface to 120 fathoms. Nearly 300 fossil species have been found from the carboniferous period down to recent times. *Astarte borealis*, a shell living at the present day in Arctic seas, is interesting from the fact that it has been found with other northern forms at a height of 1300 feet above the level of the sea, on the top of Moel Tryfan, a mountain on the south side of the Menai Straits; and also at Airdrie, in Lanarkshire, at a height of 521 feet above sea-level. These shells are evidence that during *PLEISTOCENE* times, after the period when a great ice-sheet covered Great Britain, the land was submerged beneath the sea to the amount, at least, of 1300 feet. *Astarte Omali* is one of fourteen species of the genus which are recorded as occurring in an older deposit, the *CORALLINE CRAG* of Suffolk, at this period the climate was more genial.

ASTER is a genus of plants belonging to the order *COMPOSITÆ*. As many as 350 species have been described, but Bentham and Hooker, in their "Genera Plantarum," are of opinion that these may be reduced to about 200 species. Three-fourths of the number are native in North America, a few are scattered over Europe, Asia, and South America. They are favourite flowers, known often as

Michaelmas Daisies or Christmas Daisies, as they keep in flower till very late in the season. The only British species is the Starwort (*Aster Tripolium*), which has a leafy, many-flowered stem, 1 or 2 feet high. The heads are large with



Garden Aster.

yellow disks and bright-blue rays. The starwort grows in muddy salt marshes. In asters the florets in the single outer row are strap-shaped, and have pistils; the pappus is like hair or bristles.

ASTERISK (Gr. *asteriskos*, a little star) is a figure, thus *, used in writing and printing to call the attention of the reader to a marginal or foot note. In the writing of ancient Greek manuscripts it was used to denote a remarkable passage, or one unjustly suspected of not being genuine. In the writings of the fathers and the copies of the Scriptures it is used with a varying signification, and after the invention of printing it was used with the dagger (†), &c., to distinguish the notes at the bottom of the page. At the present time the letters of the alphabet, or numerals, are more employed for this purpose.

The asterisk is also used in printed books to indicate that there is a gap in the text, in the place of the middle letters of a name, or of any word or words of an objectionable character. It is also occasionally used for the sake of dramatic effect, a row of asterisks being inserted instead of a description—the event that has been led up to being thus left to the imagination of the reader.

ASTEROIDS. The gap in the series of planets between Mars and Jupiter is so striking [see *BODE'S LAW*] that Kepler asserted there must be an undiscovered planet. On 1st January, 1800, a body of astronomers, who had divided out the zodiac for systematic hunting after the supposed planet, were rewarded by the discovery of Ceres, quickly followed by that of Pallas, Juno, and Vesta. Since then some new ones are discovered every year.

None of the asteroids can be seen by the naked eye, for the largest one is but 228 miles in diameter, and the rest are much smaller, as we show further on. Their orbits are very irregularly inclined to the ecliptic, and they can never have formed part of a planet. Many astronomers consider they may be parts of a large ring surrounding the sun, in the same way as the rings now surround Saturn, broken up into tiny fragments by some convulsion, in a very irregular way. The number of asteroids that have been discovered is now 220. Recent researches by Herr Hohnstein (communicated to the Vienna Academy) appear to prove that the number of those with a diameter of over 25 geographical miles is extremely small, and that probably all such were discovered before 1859. On the other hand, the number of asteroids with a diameter less than 5 miles seems also to be very small, at least in the parts of the asteroid zone next Mars; in the outer regions next Jupiter there may be a more considerable number of these very

small bodies. Most asteroids seem to have a diameter between 5 and 15 miles. The average number of asteroids with a diameter of 5 to 10 miles discovered annually within the last twenty years is about three; the number of those of 10 to 15 miles diameter about 1.6. Thus, should no telescopes greatly more powerful than the present ones be used in future in search for those bodies, we may expect but a moderate "find" of asteroids with diameters under 5 or over 15 geographical miles, while a considerable increase of those with diameters of 5 to 15 miles may be looked for.

ASTHMA, a nervous disease characterized by severe paroxysms of difficult breathing, accompanied by loud wheezing and a painful sense of tightness in the chest. It is caused by a spasmodic contraction of the smaller bronchial tubes, arising from a deranged condition of the nervous system. These tubes being narrowed, and losing for a time their expansive power, only a small quantity of air can be admitted to the air cells; hence the sense of oppression and of suffocation. It is almost invariably of an intermittent character, and during the interval between the paroxysms, which may be days, weeks, months, or even longer, the sufferer enjoys a period of complete relief. It has been found that nearly half of those who suffer from it have inherited it. In others it may arise from some inflammatory affection of the respiratory mucous membrane, more particularly bronchitis, with which it is often associated. It is common to both sexes (but more frequently attacks males than females), and may appear at any period of life, from infancy to old age.

The attacks may occur at any time, but in the great majority of cases they come on during the night, after a few hours' sleep. In some cases persons subject to this disease are made aware beforehand, by certain premonitory symptoms, that an attack is impending; but in other cases it comes on without any warning whatever. Sometimes the fits are brought on by change of air, fatigue, mental excitement, fog, smoke, or over-indulgence in food.

Though seldom fatal except when complicated with disease of the heart, the attacks are generally of a very painful and distressing character. The feeling of constriction at the commencement grows and increases until there is a fearful struggle for breath. The patient frequently sits fixed to a chair, with his elbows on the arms of it, or his hands planted upon his knees; or he contrives to reach the open window, where, with arms raised so as to use the powerful muscles of the upper one to assist those of the trunk in the effort at respiration, he remains gasping for breath until the attack subsides. The breath is drawn in and expired with considerable noise, the heat of the body falls, and the hands and feet become blue, cold, and shrunken, though the exertion required causes the head and trunk to be suffused with perspiration: the patient sometimes appears to be at the point of death. The paroxysm may reach its height within a quarter of an hour of the first seizure, or it may not be reached until after hours of gradually increasing suffering. It is sometimes over suddenly, and at others is prolonged for a day or two; indeed, the symptoms may vary to a large extent not only with different cases, but at different times with the same individual.

When the spasm finally subsides there is generally an occurrence of coughing, with the expectoration of small pellets of mucus of a gray colour and adhesive character. As already stated, these attacks are rarely fatal, and many asthmatics live to the full term of life. It may, however, induce other conditions of the heart or lungs which indirectly prove fatal.

The treatment of the disease during the interval consists of a careful avoidance of everything likely to induce an attack. To this end attention must be paid to the air breathed, to the diet, and to the general health. It is commonly found that those who are subject to asthma suffer

also from some form of indigestion, and are of necessity compelled to pay great attention to what they eat and drink, to avoid all heavy meals, and to take care not to eat anything for a few hours before retiring to rest.

With regard to the treatment during an attack it is found in practice that asthma is a very uncertain complaint, and that remedies which avail in one case are useless in another, or that one used with success at one time will prove quite ineffective at another with the same individual. In consequence several modes of dealing with an attack are adopted, and a variety of drugs, &c., used to afford relief. The patient should, during a paroxysm, be placed in a sitting posture, and a support, such as that afforded by a pillow, placed upon a table, provided for the elbows. Where the stomach is distended with food an emetic will prove of service, and where the bowels are confined a seidlitz powder may be taken, or relief obtained by means of a suitable injection. Fresh air should be admitted to the room. The spasm may be removed by means of the inhalation of nitrous ether, nitrate of amyl, and chloroform, but great care must be exercised in the use of these powerful drugs. Another remedy of this kind which often proves of great value both in preventing or cutting short an attack, and which may be used with perfect safety, is the use of nitro paper. This is made by soaking sheets of blotting-paper in a strong solution of saltpetre. A sheet or two of this paper may be burned in the room before retiring to rest or during an attack. Other remedies are found in strong coffee taken upon an empty stomach, in hot spirits and water, and in the use of ipecacuanha, tartar emetic, lobelin, iodide of potassium, &c.

ASTI, the name of a town and district in Northern Italy, in the province of Alessandria. The soil of the district is hilly, and well adapted for the cultivation of the vine. A sparkling fine-flavoured white wine, called *vino d'Asti*, resembling champagne, is made here. It is to be regretted that it cannot be brought in good condition to England. The country is also fertile in corn and fruit-trees, especially mulberries, the leaves of which serve to feed the silkworms. Population of the district in 1882, 166,613.

Asti, the capital of the district, is a large and well-built town, with a population of 33,233 in 1882. It is situated on the left bank of the Tanaro, a tributary of the Po, 35 miles from Turin, on the railway to Alessandria. There is some trade in silk and woollen fabrics, wines, and other agricultural produce. Of the churches, the most remarkable is the cathedral erected in 1348. Asti is a bishop's see, and has a court of justice, and a royal college, with chairs of philosophy, theology, and surgery. There is a printing office in the town, in which business has been uninterruptedly carried on since 1479. In 1862 a monument was erected to Vittorio Alfieri the great Italian poet, who was born here in 1749. The town has very much improved in recent years, and there is a good trade in silks, stuffs, and wine.

Asti, formerly called Asta, was a town of the ancient Ligurians; it was taken by the Gauls about B.C. 400; it afterwards made alliance with Rome, and submitted to Hannibal on his invasion of Italy. In the subsequent war of Rome against the Ligurians, Asta submitted to the Romans, but retained its municipal rights. Having been again taken and destroyed, in a new irruption of the Gauls, it was rebuilt by Pompey the Great, and assumed the name of Asta Pompeia. It was devastated by the Goths, under Alaric, and restored by Narses, and taken again by Alboin, who put to death many of the inhabitants. It was erected into a duchy by the Longobards. It afterwards submitted to Charlemagne, and under his indolent successors governed itself, with its consuls, as a republic, like most Italian cities, under the influence of its bishops. Asti was taken and burned by the Emperor Barbarossa in 1155; but it afterwards attained a great degree of pros-

perity, and had banking establishments in France, Flanders, and other countries. About the middle of the 13th century, the factions of the Guelphs and Ghibelines broke out in Asti, and distracted the citizens for many years after. Tired of these civil struggles, the people of Asti chose for their captain one of the princes of the house of Savoy. It afterwards fell into the hands of the Visconti of Milan, who transferred it in 1387 to the French. They retained it till 1529, when it was given up to the Emperor Charles V., by the peace of Cambrai. Charles gave Asti to his relation Beatrix of Portugal, who married Charles III., duke of Savoy; and it remained attached to the dominions of that house until the establishment of the modern kingdom of Italy.

ASTIGMATISM, a curious and not uncommon imperfection of the eye. The lens of the eye and the transparent outer coat, or cornea, are parts of nearly spherical surfaces; but a deviation from the spherical curvature exists to a certain extent in most eyes. It is not sufficient, usually, to cause any great effect, but where it is unequal along different lines, and at the same time excessive, it produces the inconvenience of astigmatism. Thus if a set of horizontal lines, and also a set of vertical lines, be looked at by a person whose eye is astigmatic, having a greater curvature vertically than horizontally, the set of horizontal lines will be seen with distinctness at a point nearer the eye than that required by the vertical lines—so that to see both series with equal distinctness the vertical series must be held further from the eye than the horizontal. Either irregular curvature of the lens or of the cornea produces astigmatism. When the defect is not so symmetrical as that named above, but the irregularity exists in various directions (the most usual case), the result is that a bright point, such as a star, becomes not a circular but a radiate figure. It is hardly possible to find an eye which is not in some degree astigmatic. For other imperfections of the organ, see EYE.

ASTORGA, a musical composer of some eminence, was born at Palermo in 1681, and studied under Francesco Scazzatti. His father, the Marchese Capece de Roffrano, conspired against the Spaniards, and perished on the scaffold in the presence of the lad; who, it is said, with great likelihood, fainted at the sight. Young Roffrano was befriended by the Princess Ursini, maid of honour to Philip V. of Spain, and was brought up in the convent of Astorga in Spain. This powerful protection procured him the title of Baron d'Astorga, and a diplomatic mission to Parma in 1701. Here he fell in love with the duke's daughter, Elisabetta Farnese, to whom he was teaching music; for he was already an accomplished musician. The duke, discovering the affair, neatly extricated himself from all difficulty by recommending Astorga to the emperor, and so sending him into an honourable banishment from Parma. He remained at Vienna through three reigns, occasionally visiting other countries, high in favour with the Austrian court, and dying in the castle of Raudnitz, which Prince Lobkowitz had given up for his use.

Astorga's "Stabat Mater," composed for the "Society of Antient Music" of London in 1713, is his best work. It is still a favourite, and was heard in London in 1880; it is considered by most critics superior even to the fine work on the same words by Pergolesi. About 100 "cantatas" by Astorga exist; these are songs, chiefly for female voices, and of great merit.

ASTORGA, the *Asturica Augusta* of the Romans, once the capital of the Astures, and now a small episcopal town with about 4000 inhabitants, in the Spanish province of Leon. Pliny (iii. 3) calls it a magnificent city. It is situated in a fertile plain near the Tuerio, about 26 miles west by south of Leon. The cathedral deserves notice on account of its high altar, which is one of the best works of Gaspar Becerra.

ASTRABAD, a city of Northern Persia, and the chief town of the province of that name, is situated near the S.E. corner of the Caspian Sea. The town is surrounded by a low and dilapidated mud wall, about $3\frac{1}{2}$ miles in circuit; and as the houses are often intermixed with trees and gardens, it presents rather a picturesque appearance. There are a large number of half-ruined buildings, among which are the remains of the splendid castle of Shah Abbas. The noxious exhalations from the surrounding forests, during the hot weather, make it so unhealthy that it is sometimes called the "City of the Plague." The population is about 10,000.

ASTRÆA, the goddess of right dealing amongst the Greeks. She was the daughter of Zeus and Themis (goddess of justice), and lived amongst men in the golden age. When that blessed time had passed away with the rule of Kronos, and to the silver and bronze ages had succeeded the iron age, Astræa, who of all the immortals had remained longest on the earth, was forced by the greed of gain, and the toil and trouble of mankind, to retire into Olympus. She forms the constellation Virgo. With her, her sister Aidos (Modesty) forsook the close companionship of mortals; and Zeus, determined to destroy the wretched god-forsaken race, overwhelmed the earth with a flood. All Greece was submerged, no living soul escaping but Pyrrha and her husband Deucalion.

ASTRAGAL or Bead, a moulding used in architecture, and applied principally to the upper ends of the shafts of columns and to their bases. It is also used in the entablatures of the Roman Doric, the Ionic, Corinthian, and Composite orders. The term is derived from the Greek *astragalos*, which signifies the bone on which the tibia rests, and sometimes a vertebra. The form of this moulding is semicircular, projecting from a vertical diameter. In Egyptian architecture, bands curved after the manner of astragals seem to bind the reeds of which the shaft of the column often appears to be formed.

The apparent use of the astragal is to bind the parts of columns and entablatures together, for which purpose it is employed both at the top of the shaft where the capital commences, and at the bottom where the base terminates.

ASTRAGALUS, an extensive genus of leguminous plants, the most remarkable species of which is the *Astragalus gummifer*, from which the substance called gum tragacanth is obtained. Although the principal part of the tragacanth of commerce is furnished by this species, it is also procured from several others. It belongs to the order LEGUMINOSÆ, suborder Papilionaceæ.

ASTRAKHAN, a government of European Russia, bounded on the S.E. by the Caspian Sea, on the W. by the country of the Don Cossacks and the Caucasus, and on the N. by the governments of Saratoff and Orenburg. It is comprised between 45° and 50° N. lat., and 44° and 51° E. lon., and has an area of about 85,000 square miles. The land is, with little exception, an enormous plain, lying below the level of the ocean and the Black Sea. It is divided into two parts or steppes, by the Volga. The soil is saturated in almost every direction with salt; the very atmosphere, the rain, and dew are charged with it; and briny lakes are of frequent occurrence. Rocks, either of limestone or sandstone, rarely occur; but the province is full of extensive moors, the soil of which consists of a deep spongy saline loam, which bears no vegetation whatever on its surface; its edges only are skirted with saline plants. It is supposed that the Caspian once covered this province, and hence the abundant beds of salt and salt-petre. There are only a few fertile spots, situated near the rivers, where fruit, vegetables, grain, and vines are reared; as well as a little tobacco and cotton.

The climate of Astrakhan is one of extremes; a dry and parching heat prevails in summer, when the thermometer frequently stands, even in the shade, at 100°

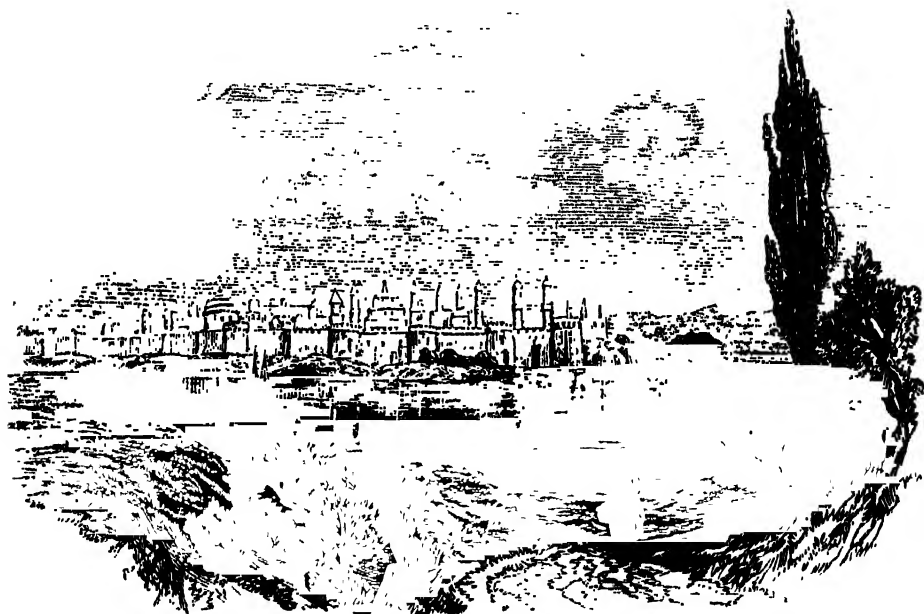
Fahr.; yet the nights are in general nipping, and the winds deposit the saline particles with which the air is charged in such profusion, that every object appears veiled in the morning with hoar-frost.

The river Volga flows through the province with a winding course; and before its fall into the Caspian, about 30 miles below Astrakhan, it branches into eight principal arms and sixty-five subsidiary outlets, forming a delta of seventy islands. This river is scarcely equalled by any other stream in the world for abundance of fish—the most important of which is the sturgeon. In the spring of the year its fishing grounds, particularly between the sea and the capital, are so abundantly stocked with fish as to employ upwards of 5000 vessels, coming to the fisheries from remote places.

The river Ural forms the eastern boundary of Astrakhan, and between it and the Volga is a dreary expanse of sand and swamps. There is a winter fishery on the Ural, which gives

employment to the poor Cossack inhabitants of the neighbouring shores.

The animals found in Astrakhan include the wild ass, camel, and antelope-saiga, whose horns are semitransparent; there are also the bustard, kite, falcon, pheasant, and snipe. The natives are herdsmen and graziers as well as fishers; droves of horned cattle are kept wherever there is pasture, and are turned out half-starved from their wretched winter quarters as soon as the snow has disappeared. Goats are also reared, not so much for the sake of their milk or flesh, as of their hides, with which the Russians prepare morocco leather. There is a fine species of hair too, which either falls from the animal's back, or is combed from it, out of which a stuff of beautiful texture is occasionally woven. But the greatest resource possessed by the rural population and nomadic tribes of the province is their flocks of sheep, which are valuable both for their wool and for their fat. The horses of the province are diminutive and ill-conditioned;



Astrakhan, at the Mouth of the Volga.

but they are suited to the climate, and are very valuable to the Kalmucks, who, when the services of the living animal are over, use the flesh for food, the skin for clothing, the sinews for ropes and tackle.

The population of Astrakhan is composed of a motley group of Russians, Cossacks, Tartars, Kalmucks, Armenians, Hindus, and other settlers. A considerable portion is composed of the Cossacks of the Ural, who are esteemed the finest, the wealthiest, and the bravest Cossack corps in the Russian service, whence they have acquired the appellation of "the Eye of the Army," and garrison the small forts along the line of their native river. The Tartars and other inhabitants are fewer in number.

To the principal branches of industry already enumerated may be added the manufacture of magnesia, tallow, and soap in considerable quantities, and distilleries of brandy and spirits. Astrakhan soap is in much request among the Russians on account of its firm substance and fragrant scent.

ASTRAKHAN, the capital of the above government, which has become the principal seat of Russian intercourse with Asia and the storehouse of fish for the whole empire, stands

on the island of Zaietchy Bugor, or "the Hare's Mound," which lies between the small river Kutum and the Volga, about 30 miles from the mouth of the Volga, and 820 south-east of Moscow. It has a navigable communication also with St. Petersburg, from which it is upwards of 1200 miles distant. The town is irregularly built, and although it contains many respectable streets and squares, most of the thoroughfares are unpaved, so that they are alternately deep sand and liquid mud. The houses present a singular medley of European and Asiatic taste; they are constructed principally of wood, brick, or mud, with only a few of stone. The ordinary population of the town is about 50,000. The uneven ground on which it stands, its half-decayed battlements, and a multitude of steeples, minarets, and cupolas, give it a handsome appearance at a distance; and the effect is heightened by contrast with the flat marshy ground which surrounds it. The climate of such a site cannot rank among the healthiest; and it is liable, moreover, to very sudden changes of temperature. Astrakhan is the seat of an Armenian as well as Greek archbishopric, and has a large number of churches. The Roman Catholics, Lutherans,

Mohammedans, and Hindus also have each their separate places of worship. There are numerous schools, missions, and printing houses in the town. The chief architectural ornaments of Astrakhan are—the "Krem" or citadel, which contains the cathedral and barracks; the "new" or "white" town, so called from its being embellished with the principal government buildings and the three factory halls, one for the use of the Russian, another for the Asiatic, and a third for the Hindu dealers; the beautiful street inhabited by the Persian merchants, on each side of which runs an arcade, supported by handsome columns; and the cathedral, which was erected in 1696, and, like most ecclesiastical edifices in Russia, consists of a massive parallelogram with four small cupolas on the roof, and a large one in the centre, from which the building receives its light.

The fisheries of the Volga centre principally at Astrakhan, or rather on the branches of the river some distance below it. Every weir has its group of huts, with a little church attached to it, in which from two to three score fishermen reside; they are divided into divers, catchers, salting-men, and makers of caviar and singlass. Each little colony is provided with spacious ice-cellars, which contain compartments for storing away the fish when salted, with intervals between the compartments which are filled with ice.

It has been calculated that, in the fishing season, the population of Astrakhan is increased by at least 30,000; a motley concourse, collected from almost every quarter of Asia and Europe, of whom nearly one-third are Russians.

Astrakhan carries on a considerable trade with Persia and the countries east of the Caspian. There are several establishments for weaving silk and cotton; and some of the inhabitants are also employed in manufacturing considerable quantities of leather—particularly a superior description of morocco and shagreen—as well as tallow and soap. There are some large saltworks near the town. Living at Astrakhan is so cheap that £20 per annum is a fair income for the maintenance of an ordinary family.

ASTRINGTONS (from Lat. *stringo*, to constringe or bring closer together) are agents which contract the fibres of muscles and bloodvessels. They produce this effect generally by a vital, but sometimes by a chemical action. Their power is manifested first, and often solely, on the part to which they are applied; yet in many instances it is extended by sympathy very rapidly over the whole body, as is observed when the austere juice of the shoe is brought in contact with the tongue. The sensation then experienced may be considered the best general test of the presence of astringency, which cannot be ascribed to any one principle, but is owing to tannin, gallic acid, and hæmatin, in vegetable astringents, and is possessed by acids and many metallic salts among mineral agents; it is also one of the effects of the application of cold to the body.

The effect of astringents, which is due to their chemical action, is nearly the same in dead as in living animal matter; their long-continued application to the skin will produce a condition similar to that of a tanned hide. They are therefore sometimes employed to effect this, when internal parts are exposed, to change them from a secreting to a non-secreting surface—such as in irreducible prolapsed uterus. Their use in this way, however, is very limited; while their vital action is extensive and important. The chief effects of astringents are to contract the muscular and vascular tissues, to diminish secretion and lessen irritability, and in many instances to impart strength or increased tone to an organ or part. Their action is always greatest on the part to which they are applied. When a drop of diluted acetic or sulphuric acid is placed on the skin, whiteness of the part is observed, which soon disappears, and the natural colour, or even a more intensely red one, follows. If this is frequently repeated, the structure of the part is changed, it ceases to secrete, is no longer

pliant, but becomes stiff and inflexible. The loss of colour is owing to the diminished calibre of the bloodvessels, which no longer admit the red globules. During the absence of these, the sensibility of the part is less than natural, just as cold and torpid fingers lose their fineness of touch. Nearly similar effects follow the internal administration of astringents. Some astringents which lessen the action of the heart are called *sedatives*; while others, which combine with and neutralize the unhealthy or excessive secretions, as lime and its carbonate with the secreted fluids of the intestinal canal, are more properly termed *absorbents*. When astringents are applied directly to the bleeding vessels, such as to external wounds, or to the nostrils or gums, they are termed *styptics*, and in such cases they often act chemically as well as vitally.

Of vegetable astringents the chief are barks, as of oak and willow, the best kind of the former of which is obtained from the *Quercus robur* of Linnæus (the true British oak), which is synonymous with the *Quercus pedunculata* of Willdenow, while the inferior sort is obtained from the *Quercus sessiflora* of Salisbury, which is synonymous with the *Quercus robur* of Willdenow; the best willow-bark is procured from the *Salix pentandra*, or sweet bay-leaved willow, though very excellent bark is yielded by the *Salix Russeliana*, or Bedford willow; roots, as of tormentil (*Potentilla tormentilla*); bistort (*Polygonum bistorta*); common avena (*Genium urbanum*), which are British plants; and rhatany (*Krameria triandra*); rhubarb (*Rheum palmatum*); pomegranate (*Punica granatum*), which are exotic plants; leaves of acetostaphylos (*Uva ursi*), petals of the *Rosa gallica*, fruits of *Prunus spinosa*, or sloe-thorn (*Punica granatum*), and secreted juices of many plants, as kino, from *Pterocarpus Senegalensis*, and several others; and catechu, from *Acacia catechu*, and galls, from *Quercus infectoria*—in all of which the astringent principle is tannin, with more or less of gallic acid; and lastly log wood (*Hæmatoxylon Campechianum*), in which hæmatin as well as tannin possesses an astringent property. Acetic acid must also be classed among the vegetable astringents.

The mineral astringents are—diluted sulphuric acid, and salts of iron, zinc, copper, silver, and the salts of lead. Cold, in whatever way applied, is also a valuable astringent.

The ancient Egyptians would appear to have been acquainted with the power of astringents in preserving vegetable as well as animal substances, and they seem to have dipped the coarse cloths in which the mummies were enveloped in some astringent liquid, which tanned the skin, and rendered it less subject to change, as well as excluded the air from the interior of the body.

ASTROCARYUM, a genus of PALMS found in small groups or in single specimens in the tropical parts of South America, of middling stature, and of a very singular appearance on account of the spines with which they are armed. Their stems are covered all over, except at the places where the leaves are attached, with stiff and very numerous spines, which also cover the foliage, fruit-stalks, and sometimes even the fruit. The leaves are feather-shaped, and form a dense crown at the top of the stem. The fruits hang down from among the leaves; they are fleshy, of a yellow or orange colour, and have a hard stone in the middle.

Astrocaryum Murumuru is a common inhabitant of swampy places in the neighbourhood of Para, where it is called *Murumuru*; the flesh of the fruit resembles the melon in flavour and the musk in odour, and is considered a great delicacy by the Americans. Another species, *Astrocaryum Alpi*, has very hard wood, which is much used for bows and similar purposes, where hardness and toughness are required. The fibres of the leaves of *Astrocaryum vulgare* are much valued for fishing nets. These are known as Tucum palm nets.

ASTROLABE, from two Greek words signifying "to take the stars." It has an earlier and a later meaning. As used by Ptolemy, it may stand for any circular instrument used for observations of the stars; but in the sixteenth and seventeenth centuries it signified a projection of the sphere upon a plane, being used in the same sense as the word *planisphere*. To this small projection, which had a graduated rim, sights were added for the purpose of taking altitudes; and in this state it was the constant companion and badge of office of the astrologer. In later times, before the invention of Hadley's quadrant, a graduated circular rim with sights attached, called an astrolabe, was used for taking altitudes at sea.

ASTROLOGY. If this word were used in a sense analogous with that of *geology* or *theology*, it would mean simply the science of the stars; while *astronomy* might mean the science of their order and arrangement. But the term long signified the discovery of future events by means of the position of the heavenly bodies.

It has fortunately long been unnecessary to produce any arguments against this pretended science to educated persons, but it may be useful to show a few of its details. Works seriously professing to inculcate and defend the principles of astrology are not only sold but bought with avidity. One or two popular almanacks still give astrological predictions. This may be a mere matter of amusement with the more enlightened, but it is to be feared that there are some who play with edge-tools in reading these fooleries.

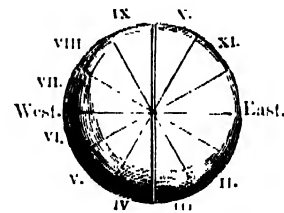
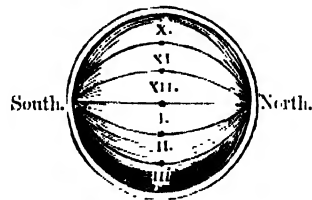
Our old English writers, particularly the dramatists, cannot be well understood without some information upon the leading terms and principles of this art; which, therefore, may be as lawfully studied as the mythological history of Jupiter and the "Metamorphoses" of Ovid.

The science which, under the name of astrology or some term of equivalent meaning, found universal belief among all the nations of antiquity except the Greeks, and also prevailed through the whole world of the middle ages, is based upon the supposition that the heavenly bodies are the instruments by which the Creator regulates the course of events in this world, giving them different powers according to their different positions. This is the description of the more learned astrologers; for we need hardly say that the ignorant have made the stars themselves the agents, just as the image of any deity has generally come in time to be regarded by the vulgar as the deity himself. The arguments again: 1. astrology are, first, that it is self-contradictory; secondly, that its predictions are not borne out by facts. To see the first of these we must describe the leading principles of the art.

In the following globes the circle projected horizontally represents the horizon, the double circle the meridian, and the other four circles are drawn at equal distances from the meridian and horizon, through the north and south points of the latter, thus dividing the whole heavens, visible and invisible, into twelve equal parts. Let these circles remain immovable, while the diurnal revolution of the globe takes place under them. The twelve divisions are called the twelve *houses* of heaven, and are numbered in the order in which they would rise, if the circles accompanied the diurnal revolution. Every heavenly body passes through the twelve houses in twenty-four hours, but is not always in the same house with the same stars, except at the equator. For it is evident that, in order to have two bodies always in the same house, the revolution must take place round the north and south poles of the heavens, which poles are in the horizon only to a spectator on the equator itself. The principal point attended to in each house is the part of the zodiac which occupies it; and the place of any planet in the house is the distance of the body from the cusp, or boundary circle, measured on the zodiac.

The houses have different powers. The strongest of all

is the first, which contains the part of the heaven about to rise—this is called the *ascendant*; and the point of the ecliptic which is just rising is called the *horoscope*. The next house in power is the tenth, which is coming on the meridian, &c. The first is the house of life; the second, of riches; the third, of brethren; the fourth, of parents; the fifth, of children; the sixth, of health; the seventh, of



marriage; the eighth, of death; the ninth, of religion; the tenth, of dignities; the eleventh, of friends; the twelfth, of enemies. Each house has one of the heavenly bodies as its lord, who is stronger in his own house than in any other, as is but fit; and of two planets, equally strong in other respects, he who is in the strongest house is the stronger. Now conceive all plants, animals, minerals, countries, &c., parcelled out under the different planets, which exercise their influence in abundance of different ways, according to the houses they may happen to be in for the time, and their positions relatively to each other, the result will be as good an idea of the mysteries of astrology as it is worth anybody's while to obtain.

That the ancient system of astrology contained the most contradictory assertions may be made evident in very few words. The position of the heavens at the time of birth settled every man's character of body and mind, the various fortunes he would meet with, and his relative positions with regard to friends and enemies. Thus, every one who was born at or very near the same time as Alexander the Great, in the same country, would have a right to expect a somewhat similar career; and twin brothers could never fail to have the same horoscope, and therefore the same success in life. To take a case that might have occurred: Suppose two men had engaged to throw dice against each other for their whole fortunes, and that they went the night before to consult different astrologers in the same town. To them it would not be necessary to tell their names or exhibit their horoscopes; the present position of the heavens would be sufficient for pointing out a favourable hour, and if both astrologers worked by the same rules, as they ought to do, they would both arrive at the same result—that is, the same would be recommended to both inquirers, though one of them must certainly lose.

The astrologers never made any allowance for the precession of the equinoxes. Thus, though the *constellation* Aries is now in the *sign* Taurus, and the influences of its stars ought to have moved with them, we find that the *astronomical* Aries, or the first thirty degrees of the ecliptic, is used for the constellation. For astrology this or any other error is of little consequence, but such a practice would be fatal to *astronomy*.

The art is at present under the ban of the law, in order

that designing persons may have at least one access stopped to the pockets of the credulous. By the 1 James I. c. 12, sorcery of all species was prohibited, though it does not appear certain that this term included astrology; but by the vagrant act, 5 Geo. IV. c. 8, s. 4, all "persons pretending to tell fortunes, or using any subtle craft, means, or device, by palmistry or otherwise, to deceive and impose upon any of his Majesty's subjects," are rogues and vagabonds—that is, punishable by any magistrate with three months' imprisonment and hard labour.

The history of astrology, at least up to the middle of the fifteenth century, is very nearly that of astronomy, since the latter branch of the sciences, except among the Greeks, was mostly cultivated for the sake of the former. Hence to astrology, as to alchemy, we owe many really useful discoveries. There is no question that the necessity which the astrologer lay under, of being ready, at any moment, to lay down the positions of the heavenly bodies, produced great numbers of useful tables and observations; and the Greek works which have been preserved by the Arabs were valued principally for the use to which their mathematics could be turned in astrology. The origin of the science is beyond the reach of history, nor is it much worth while to collect all that is known on this point. It certainly came into Europe from the East, where it is mentioned in the earliest records of every nation. The Chinese are said to have placed it on the same footing with agriculture and medicine; the Chaldeans cultivated it sedulously, and the invention is attributed to them by Suidas; and the Hindus have long regulated the most important actions of their lives by the stars. Among the Egyptians it was of great antiquity; but it is not mentioned in the books of Moses, unless included in "magic" or sorcery, which probably it was. The books of Isaiah and Jeremiah allude directly to it in several places, as does also that of Daniel. During the Captivity the Jews appear to have learned the art, and from that time probably, but certainly in the earlier centuries of the Christian era, became much addicted to it.

In Greece, at least during the classical ages, astrology found no reception; nor do we trace any marks of it even in the earlier astronomical writers of that country. The system was little in harmony with the allegorical mythology which prevailed there, and the oracles afforded perhaps sufficient nourishment to the appetite for the marvellous. But among the Romans astrology was cultivated with avidity from the time of the conquest of Egypt, in spite of several edicts of the senate; and in the second century the whole world was astrological.

All the followers of Mohammed are and have been astrologers. The predestinarian doctrines of their system render the transition easy and natural; for, as we have seen, the science of astrology is based upon the notion of the necessity of human actions. The establishment of the Moors in Spain, and the crusades, caused the introduction or the increased cultivation of the art among the descendants of the Gothic barbarians who destroyed the Roman empire. But the predestinarian principle assumed a modified form, more consistent with the belief of the Roman Catholic Church. It was said that the stars only incline, but cannot compel; which position, while it left the will free, was a convenient explanation of any failure in the predictions. The Greek and Roman Christians of the earlier centuries had in many instances received the whole of astrology; in others, the modified belief above mentioned. St. Augustine argues against astrology altogether. The church, in its public capacity, condemned the art in the first councils of Braga and Toledo, and in the Decretals. The doctrine of astrology was among the errors imputed to the Priscillianists. But many Roman Catholics in later times adopted the same opinions, and among them churchmen of the highest rank, such as Cardinal d'Ailly (died in 1425), who calculated the horoscope of Jesus Christ. The

astrology of comets, which is hardly yet out of date, has even been recognized by a pope. In the fifteenth century Calixtus III. directed prayers and anathemas against a comet which had either assisted in or predicted the success of the Turks against the Christians.

The establishment of the Copernican system was the death of astrology, which survives now as a mere toy, or as a tool ready to the hands of unscrupulous knaves wherewith to juggle the foolish.

ASTRONOMY signifies "the laws of the stars," and is applied generally to all that relates to the motions and theory of the heavenly bodies, as well as of the earth. If we except general terms, such as *science*, there is perhaps no single word which implies so many and different employments of the human intellect.

The work of the astronomer begins in the observatory, where means are provided for noting the positions of the stars. We shall therefore confine ourselves here to a slight sketch of the annals of astronomy, and a few general considerations. There are two classes of observations. The first is that of known bodies, of which the places are so nearly determined that no question remains except about quantities less than a second of time, or its corresponding quantity, fifteen seconds of space; and for this class the consideration what phenomena shall be observed is made to rest entirely upon the instruments—those phenomena being preferred, for the observation of which the steadiest instruments can be made. These move only in the meridian, and the star is waited for. The second class of observations, such as those of comets, double stars, and all mere appearances, which require an instrument that can be pointed to any part of the heavens, or can be made to follow a star, is performed by telescopes which are made to revolve with the heavens.

The second division of astronomical labour is the department of the mathematician only. The observations as they come from the instruments are subject to all the errors of the latter; and no perfect instruments can be constructed. The best circle that can be made is slightly oval; the best pivot that can be turned will not be truly cylindrical. The question now comes, in what manner to compare different species or sets of observations, so that the discordances themselves shall point out the quantity and quality of the instrumental errors; and how from thence to derive the corrections necessary for future observations; also, how to choose the time and manner of observation, so that any particular error, whether of instruments or theory, shall be least if the observer be desirous of avoiding it, or greatest if he wish to detect and measure it. Every-day experience shows that there is no better test of the progress of observation than the discovery of new instrumental errors, provided only the quantities in question become less and less. The angular error which now sets an observer to work to correct his result is less than the six-hundredth part of that which would have been required to annoy Ptolemy or Hipparchus. And in speaking of an instrument we may consider the observer himself as a most material part, on the combined power of whose eye, ear, and judgment the correctness of the observation depends. It is hardly to be expected that, even under precisely the same circumstances, two observers should note the same phenomenon so as to agree within a small fraction of a second; and recent experiments on phenomena noted with both the eye and hand have demonstrated the existence of small differences between different observers, attributable only to their different habits of perception or physical constitution.

When observations have been as nearly as possible freed from instrumental errors, the next step would be, if we could imagine a system of astronomy only in its infancy, with instruments as near perfection as our own, to deduce, by combination of mathematical reasoning and calculation,

the real places of the stars for some one moment, and the magnitudes and laws of the various motions to which they are subject, whether periodical or permanent, and whether arising out of the motion of the earth or out of a proper motion of the stars themselves; and for the solar system, to determine the relative motions and positions of the planets and their satellites, which can only be done by the previous measurement of the earth and subsequent comparison of the results of one observatory with those of another. But these primitive determinations have always been in progress with the instruments, and results have increased in accuracy with the power of observing; so that instead of working afresh for the determination of *elements*, as they are called, almost the whole of modern astronomy is a process of correction of those which have been previously obtained. This greatly facilitates operations. The measurement of the earth itself, and the determination of its figure, which is the basis of planetary astronomy, so far as ascertaining the actual dimensions of our system is concerned, is treated as a separate science under the name of geodesy, though it is a constituent part of astronomy, both as to the methods by which it is carried on, and some of the objects for which it is undertaken.

The third department of astronomy, being that which requires the most extended knowledge of mathematics and the highest exercise of thought, is that which often goes under the name of *physical astronomy*, and consists in the combination of the various phenomena as actually observed, in order to find out what are their physical causes, and according to what laws those causes act. It is evident that, without some success in this branch of the science, there can be no power of prediction, except what arises from the presumption that preceding phenomena have run their whole possible round, so that nothing can happen except a repetition of what has happened. To a rough view this seems to be the case, and is so in a great measure; but to the instruments of an observatory there appears no such complete *periodicity*. To this head we should refer such questions as those of REFRACTION, ABERRATION, and GRAVITATION. The term physical astronomy is usually applied to investigations connected with the latter only; but both etymology and analogy warrant its extension to the former. Under this also we must place all questions connected with the physical constitution of the various planets, so far as that can become known. Of the great increase which the predicting power of astronomy has received since Newton deduced the motions of our system from the simple law of attraction, there is no need to speak; but we shall notice one peculiar use of that principle, by which the results of observation are anticipated, and the first and second of our divisions of astronomy advanced, while at the same time the *experimentum crucis* of the truth of the principle is furnished. There are many small inequalities of the solar system, which, though not likely to show themselves, mixed up as they are with so many others, are yet certain to be found, if looked for at the time when their effects are most sensible. The results of theory point out that a certain inequality, whose law and approximate magnitude it gives, should be found in the motion of a certain body, if the Newtonian principle be correct. On being looked for in the manner which the nature of the inequality itself shows to be most advantageous, it is found accordingly, and its exact magnitude, as ascertained by observation, is often of use in correcting that obtained from theory. For example, had it not been for methods of this kind, our knowledge of the motions of Jupiter's satellites would have been still in a state of the merest infancy.

The real history of *written astronomy*—that is, of actually recorded and moderately correct observations, in sufficient number to constitute a body of science—commences with Hipparchus, about 160 years before our era. Prior to his time it is difficult to do more than speculate upon the few

facts which are left to us. That astronomical observation of a certain description began in the very earliest ages there can be no doubt; but here there could be but one instrument, the horizon, and but one theory, the actual motion of the heavenly bodies round the earth. The earliest observations mentioned are those of the rising and setting of stars, which led to the registration of the different appearances presented by the heavens in the course of a year, to which may be added lunar and solar eclipses, and comets. The rapid motion of the moon in the heavens would probably have caused the lunar zodiac to be first marked out, though it is clear that the solar zodiac was of a very early date. Astronomical observation has always been one of the accompaniments of civilization, both in modern and ancient times; and however much we may conceive ourselves entitled to look down upon the notions of our predecessors, we must not forget that in speaking of any country which possessed an astronomical theory worth so much as laughing at in modern times, we place that country in the list of exceptions to the rule which prevailed through the greater number. If the Chaldean system appear insufficient, or the Ptolemaic complicated, these are yet real results of thought, and to a certain extent actual representations of fact.

The nations who are known to have cultivated astronomy before the Christian era are the Chinese, Indians, Chaldeans, Egyptians, and Greeks. The first made it a matter of politics, the next three of religious observance, and all these four applied it to astrology. Among the Greeks only the science had no reference either to politics, religion, or soothsaying; and here it throve with a vigour which permits us to make the astronomy of Hipparchus and Ptolemy a part of the chain which ends with Newton and Laplace.

The Chinese have some annals which claim to go back to the year B.C. 2837, but of astronomical phenomena they record hardly anything, except eclipses of the sun and the appearance of comets, and of the former nothing but the fact and the day of their happening. Gaubil, who recalculated their assorted eclipses, could not verify more than one of a date anterior to the time of Ptolemy; and even that one is doubtful. The fact of the motions of the planets was known to the Chinese, but not the precession of the equinoxes, till about A.D. 400. They had also the Metonic and Calippic periods.

The question with regard to the Hindus is not whether their astronomy is sufficiently high in its pretensions to make it worth while to inquire into its antiquity, but whether an astronomical system of a very advanced character, which certainly was found among them, is or is not as old as they assert it to be. The epoch claimed by the tables is B.C. 3102, the beginning of the Cali-yug, or iron age of Hindu mythology, at which time a conjunction of all the planets is asserted. Those who are curious may consult Bailly or Delambre; but the question has unfortunately been treated with considerable acrimony on both sides.

The Chaldeans had long observed the risings and settings of the heavenly bodies, as well as eclipses. They had the celebrated Metonic period of nineteen years, and it is supposed that Meton obtained it from them, though this point is doubtful. Simplicius, a commentator on Aristotle, relates that a series of eclipses preserved at Babylon was transmitted by Alexander to Aristotle, and contained the observations of 1903 years preceding the conquest of Babylon by the Macedonians. But Ptolemy only gives a few of them, the earliest of these not reaching higher than B.C. 720. They are of the roughest kind, the times being given only in hours, and the part of the diameter eclipsed within a quarter; but nevertheless they are the earliest trustworthy observations we possess, and led, in the hands of Halley, to the discovery of the acceleration of the moon's mean motion. We find also among the Chaldeans the use of the *clepsydra*

as a clock, of the gnomon as an instrument for measuring solstices, and of the hemispherical dial called by the Greeks *skaphe*, for ascertaining the positions of the sun. By the clepsydra they were enabled to divide the ecliptic nearly into twelve equal parts, and are thus said to have invented the zodiac.

The Egyptians have left us no observations, and few astronomical relics the meaning of which can be made very clear; but it seems possible that the Pyramids, when more is known about them, may prove to be valuable records of their astronomical knowledge. See PYRAMIDS.

With regard to the astronomy of the Greeks previous to the earliest extant works, there is little to be said. The Ionian school, founded by Thales B.C. 600, followed in succession by Anaximander, Anaximenes, and Anaxagoras, added little or nothing to practical astronomy. If Thales announced the eclipse of B.C. 610, it was the year only; and the opinion of the earth's motion, attributed to Anaximander, rests on slender foundation. The school of Croton founded by Pythagoras, about B.C. 500, and sustained by Philolaus, produced no observers, though it certainly adopted the opinion of the earth's motion. Meton, B.C. 432, introduced the cycle of nineteen years for the moon's motion; Calippus, B.C. 330, introduced the improvement on the former known by his name. Eudoxus of Cnidus, B.C. 370, brought into Greece, according to Pliny, the year of 365 $\frac{1}{4}$ days, and wrote some works, one of which exists in the poetical version of Aratus. Timochares and Aristyllus, B.C. 300 (?), made the observations which afterwards enabled Hipparchus to discover precession. Pythius, about the time of Alexander, measured the latitude of Marseilles with tolerable accuracy. The work of Aristotle on astronomy is lost; and, what is still more to be regretted, that of his disciple Endemus on the history of astronomy. The poem on the sphere, attributed to Empedocles, B.C. 450, is probably much more modern.

We pass over Antiochus, B.C. 300; Euclid of Alexandria, B.C. 300; Aratus of Cilicia, B.C. 281; Aristarchus of Samos, B.C. 280; Manetho the Egyptian, B.C. 260; and come to Eratosthenes of Cyrene, B.C. 240, who observed the obliquity of the ecliptic, and the latitude of Alexandria; and from the latter, and the fact that at Syene the sun was vertical at the summer solstice, deduced an approximation to the earth's magnitude. His approximation makes a degree to be 700 Greek *stadia*. The stadium measured 606 feet 9 inches, English. His value of the obliquity of the ecliptic—11 parts out of 166 of the whole circumference—was adopted by Hipparchus and Ptolemy. Archimedes of Syracuse died B.C. 212. He observed solstices, and attempted to measure the sun's diameter. His writings show that trigonometry was as yet unknown.

Hipparchus of Bithynia, B.C. 160–125, was the greatest of all the Greeks in astronomy. In his youth he wrote a commentary on Aratus, the only work of his which still exists. He discovered the precession of the equinoxes, by comparing his own observations with those of Aristyllus and Timochares, or others of his predecessors. He was the first who employed processes analogous to those of plane and spherical trigonometry, for which he constructed a table of chords. He first used right ascensions and declinations, which he afterwards abandoned in favour of latitudes and longitudes. He suggested the method of referring terrestrial positions to latitude and longitude, and was probably the inventor of the stereographic projection. He determined the mean motion of the sun and of its apogee, the inequality of the sun's motion, and the length of the year, to greater exactness than his predecessors. He found the mean motion of the moon, of her nodes, and of her apogee; her parallax, eccentricity, the equation of her centre, and inclination of her orbit. His observations also led him to suspect another inequality in the moon's motion, which Ptolemy afterwards discovered—

the evection. He calculated eclipses, and used the results in the improvement of the *elements*. He made one of the first steps towards a correct representation of phenomena, by supposing the sun to move round the earth in a circle, the earth not being at the centre. His catalogue of the longitudes and latitudes of 1081 stars was the first at all worthy of the name. It is preserved in the "*Almagest*" of Ptolemy. If Hipparchus had possessed the pendulum and the telescope fifty years might have enabled his successors to place astronomy in the state in which it stood at the birth of Newton. Considering his means, his observations are perhaps unequalled.

After the death of Hipparchus there is no astronomer of eminence till Ptolemy. Between them we have Hypsicles of Alexandria; Geninus of Rhodes, B.C. 70; and Posidonius. Theodosius of Bithynia, B.C. 50, left a work on spherical geometry, another on climates, and a third on the phenomena of day and night. Sosigenes of Alexandria, B.C. 50, corrected the calendar under Julius Cæsar. Hyginus left an astronomical description of the heavens. Manilius, a Roman, A.D. 10, wrote an astronomical and astrological poem. Seneca, A.D. 50, wrote a book on natural philosophy which contains many pieces of information on astronomical history, but is principally remarkable for his bold opinions on the nature of comets. These he declares to be planets, whose laws he predicted would one day be calculated, and that posterity would wonder how things so simple could have so long escaped notice. Menelaus, A.D. 80, has left three books of spherical trigonometry. Theon of Smyrna (not to be confounded with his namesake of Alexandria, two centuries and a half later), in the time of Hadrian, wrote on astronomy, and made a collection of astronomical works. His observations are cited by Ptolemy. Cleomedes wrote on astronomy in the second or third century of our era.

We must suppose that there were many real observers between the epochs of Hipparchus and Ptolemy; but from the loss of even their names, and the silence of Ptolemy himself, it is clear that no discovery of any importance was made.

Ptolemy of Alexandria, A.D. 130–150. We must briefly mention his works, his system, and his discoveries. The "*Mathematikē Suntaxis*," or "*Mathematical Collection*," afterwards called "*Megalē Suntaxis*," and by the Arabs the "*Almagest*," is the work from which we derive most of our knowledge of the Greek astronomy. We find there a full account of the observations and discoveries of Hipparchus; those of Ptolemy himself; the reasons and elements of his system; various mechanical arguments against the motion of the earth, which show that the first principles of dynamics were utterly unknown; a description of the heavens and the Milky Way, and the catalogue of stars of Hipparchus, reduced to his own time by an assumed value for precession; a theory of the planetary motions; the length of the year; the instruments he employed, &c.

The Ptolemaic system was an attempt to represent the motions of the planets by supposing them to move uniformly in circles, the centres of which themselves moved uniformly in circles round the earth. The angular motions of the planets, as then known, were sufficiently well represented by this system; not so their changes of distance from the earth, as seen in their apparent diameters. Yet this was the universal system of after-times till Copernicus.

The principal discovery of Ptolemy is that of the *lunar erection*, an inequality such as would be caused by an alternate increase and diminution of the eccentricity of the moon's orbit. He also discovered REFRACTION, and made some tolerably correct experiments to determine its law. He explained the apparent enlargement of the discs of the sun and moon when near the horizon. He extended the projection of the sphere of Hipparchus. He entered into the investigation of every point which Hipparchus had touched, in some instances finding more correct values,

in others altering without amending. He was not an astronomer only, but wrote also on geography, music, chronology, mechanics, and astrology. With Ptolemy the originality of the Greek school ends. We must come to the Arabs before we find anything worth particular notice.

Sextus Empiricus, A.D. 173, described and wrote against the Chaldean astrology. Censorinus, A.D. 238, wrote an astrological work on the day of nativity, containing historical information with regard to astronomy. Julius Firmicus Maternus, A.D. 370, wrote on astronomy. Pappus of Alexandria, A.D. 383; Theon of Alexandria, A.D. 385, the most celebrated commentator on Ptolemy; Hypatia (his daughter), murdered A.D. 415, the first female on record celebrated for her scientific talents; Martianus Capella, A.D. 470; Thius of Athens, A.D. 500; Simplicius, A.D. 546; Proclus Diadochus; Isidore, archbishop of Hispalis (Seville), A.D. 636; Bede, A.D. 720; Barlaam the monk, A.D. 1330; and Michel Psellus, A.D. 1050.

It is remarkable that, excepting his own commentators, few of the above-mentioned authors ever quote Ptolemy. Had it not been for the Arabian philosophers, the writings of the latter must have been lost.

The Alexandrian school was destroyed by the Saracens under Omar, A.D. 640; and the rise of astronomy among the eastern Saracens dates from the building of Bagdad by the Caliph Al Mansur, in the year 762. In the reign of this prince translations of the Greek writers were begun; and with nearly the same instruments and the same theory as Ptolemy, a career of four centuries of observation commenced, during which many astronomical elements, and in particular the obliquity of the ecliptic and the precession of the equinoxes, were more accurately determined.

In the reign of Al Mansur, son of Harun-al-Raschid, himself a diligent observer, great encouragement was given to astronomy. A degree of the meridian was measured, but with what accuracy cannot be known, from our ignorance of the measure employed.

Albateginus, or Al Batani, A.D. 880, discovered the motion of the solar apogee, corrected the value of precession, the solar eccentricity, and the obliquity of the ecliptic; and published tables. He is the first who made use of sines (instead of chords) and versed sines. He found the length of the year more accurately. He is, beyond all doubt, the only distinguished observer of whom we know anything between Hipparchus and Tycho Brahe.

We must also mention Alfraganus, or Al Fergani, and Thabet ben Korah, both about A.D. 950; Ebn Yunis and Abul-Wefa, about A.D. 1000; Alphetradius of Morocco, A.D. 1050; Arachel, a Spanish Moor, A.D. 1080; his contemporary Allazeni; Geber, and Abul Hassan.

We have Persian tables (of the eleventh century?) translated by George Chrysococca, a Greek physician, in the fourteenth century; but the best known are those of Nasireddin, published A.D. 1270, under the protection of Hulagu, grandson of Genghis Khan, and conqueror of Persia.

Ulug Beg, grandson of Timur, A.D. 1433. This prince made a large number of observations at Samarcand. His catalogue of stars of the date above mentioned was the most correct then published. He also gave tables of geographical latitudes and longitudes.

In China, Cocheon-King, A.D. 1280, patronized by Kublai, brother of Hulagu, and fifth successor of Genghis Khan in the partial conquest which that prince made of China, made a great number of good observations. He introduced spherical trigonometry, and rejected the ancient chronology.

Since the fifteenth century, astronomy has declined throughout the East. The Chinese received many methods from the Jesuits, but to little purpose. Among the Hindus there are very few who can understand the ancient writings. The Turks and Persians have little besides

astrology. We now proceed with the chain of European astronomy.

Astronomy was introduced again into Europe by means of the Greek writers, mostly through translations from the Arabic. The first translation of the "Almagest" of Ptolemy was made under the auspices of the Emperor Frederick II., about A.D. 1230.

Sacroboeco (an Englishman named Holywood), A.D. 1220, wrote a work on the sphere taken from Ptolemy, &c. It continued for a long time in great repute. He also wrote on the calendar. We can do no more than name his contemporary Jordanns; Alfonso X., king of Castile, A.D. 1252; Roger Bacon, A.D. 1255; the Cardinal Cusa, A.D. 1440; and George Parbach, A.D. 1460.

John Müller, called Regiomontanus (died A.D. 1476), made an abridgment of the "Almagest," published more extensive trigonometrical tables, extended various parts of trigonometry, and was an observer, though not in this respect superior to some of the Arabs. His almanacs were the first which were worthy of the name, and were in great repute.

We may now name George of Trebizond, called Trapezuntinus, who died A.D. 1486; Bianchini, A.D. 1495; and Waltheus, died A.D. 1504.

The following are inserted that the reader may know to what names to refer for the astronomy of the time immediately preceding the promulgation of the system of Copernicus: except in this point of view there is but little interest attached to their labours:—Riccius, A.D. 1521; Werner, died A.D. 1528; Stöffler, died about A.D. 1531; Munster, died A.D. 1552; Fracastorius, died A.D. 1543; and Fernel, who died in 1558.

Copernicus, born 1473, died 1543. He applied himself to astronomy from A.D. 1500. In 1530 he had finished his tables of the planets, and his work "On the Revolutions of the Heavenly Bodies," containing an explanation of the Copernican system, which, it is almost unnecessary to say, was a revival of the opinions of the Pythagorean school on the motion of the earth. It was published in 1543, and its author died immediately afterwards. Copernicus improved the lunar tables, and gave, to a considerable extent, an explanation of celestial phenomena upon his own system. His book is a mixture of his own original and sagacious notions and of the old philosophy; and he was far from being able to answer the mechanical objections of his time. What might have struck so bold a thinker, had he lived to face opposition, cannot be told; but, as the history stands, we shall come to the time of Galileo before we find all objections satisfactorily answered.

From this period, at which the preservation of printed works commences, our limits will not permit our giving even the names of many astronomers.

We may mention, however, Reinhold, the friend of Copernicus and advocate of his doctrines, who formed the "Prutenic Tables;" Recorde, who wrote the first English treatise on the celestial phenomena; Nonnius, inventor of an ingenious method of division of the circle, which has often caused it to be supposed that he anticipated the invention of Vernier; Merator (Gerard, died 1594), who gave the first idea of the projection known by his name.

Up to this time the means of observation had been undergoing gradual improvement, more by attention to the construction of the older instruments than by the introduction of any new principle. The Copernican theory had its advocates, but was not yet adopted by many. Algebra had been introduced into most parts of Europe, but was not yet in a state to furnish much assistance in trigonometry. Logarithms were not yet invented, nor do we find the instruments fixed in the meridian, the telescope, or the pendulum clock. The first observer who made any important additions to the phenomena of the heavens, as received from the Arabs, was Tycho Brahe.

Tycho Brahé, born 1546, began to study astronomy, 1560; commenced his observations at Hven, an island near Copenhagen, 1582; was driven from thence, 1597; died 1601. He made a catalogue of the fixed stars more accurate than any which preceded, gave the first table of refractions, discovered the variations and annual equation of the moon, the variation of the motion of her nodes and of the inclination of her orbit, and that of the obliquity of the ecliptic. He also ascertained that comets (those of his day, of course) were further removed from the earth than the moon; in fact, that they had no parallax which his instruments could discover, thus refuting the notion that they were atmospheric bodies. He greatly improved and extended the instruments in use, as well as all the methods of observation. Tycho Brahé did not admit the Copernican theory, but substituted for it one of his own, usually known by the name of the Tychonic system. This consisted in supposing the sun to move round the earth, but all the other planets to move round the sun, being also carried with it round the earth. This system explains all the appearances as well as that of Copernicus; and we must say (though it is always usual to reproach Tycho for refusing to admit the simple system of Copernicus) that by this means the *then* unanswerable arguments against the Copernican system were avoided.

The reformation of the calendar took place in 1582, under Pope Gregory XIII.

From the time of the death of Tycho Brahé to that of Newton is the next great epoch in the history of astronomy.

The following are the dates of the remarkable points for which a reader is likely to consult such a work as the present.

1581, or thereabouts. Galileo remarks the isochronism of the pendulum.

1603. Bayer's maps, in which the stars are first denoted by letters.

1609. Galileo made a telescope from a general description of a magnifying instrument made by one Jansen, in Holland. Kepler publishes his work on Mars, in which he establishes, from Tycho Brahé's observations, the elliptic form of the orbit, and the proportionality of the areas to the times. These are called Kepler's first and second laws.

1610. Galileo announces the discoveries of Jupiter's satellites—of spots on the moon—of nebulae—of some new appearances in Saturn, afterwards found to proceed from the ring—phases of Venus.

1611. Galileo observes the spots on the sun.

1616. Prohibition of the theory of Copernicus by the Roman court.

1618. Kepler announces his third law, that the squares of the periodic times of the planets are in proportion to the cubes of their distances from the sun.

1627. The "Rudolphine Tables," published by Kepler, from the observations of Tycho Brahé.

1631. Gassendi first observed the transit of Mercury over the sun's disc, measured the diameter of Mercury, and predicted that of Venus with success. Verrier published his invention of the instrument which bears his name.

1633. Norwood measured the meridian from York to London, and gave a more accurate value of the degree than his predecessors. Descartes produced his system of vortices. Galileo was obliged to recant his Copernican opinions by the Inquisition of Rome.

1639. Horrox and Crabtree first observed a transit of Venus over the sun's disc. The former ascertained the diameter of Venus. They were the only two who saw this particular transit.

1640. Gascoyne applied the telescope to the quadrant, and a micrometer to the telescope.

1654. Huyghens completes the discovery of Saturn's ring.

1655. Huyghens discovers Saturn's fourth satellite.

1663. Gregory makes his reflecting telescope.

1665. Cassini determines the time of rotation of Jupiter.

1666. Cassini determines the rotation of Mars, and makes a first approximation to that of Venus. Academy of Sciences founded at Paris, and Observatory first thought of and commenced in the following year. Auzout applied the micrometer to the telescope without any knowledge of Gascoyne. Newton first turned his attention to gravitation.

1669. Newton made his first reflecting telescope.

1671. Richer, in a voyage to Cayenne, observes the shortening of the seconds pendulum in approaching the equator. Cassini discovers Saturn's fifth satellite.

1672. Cassini discovers Saturn's third satellite.

1673. Huyghens publishes his "Horologium Oscillatorium," in which are found the first theorems on central forces and centrifugal force.

1675. Roemer announces his discovery of the velocity of light by means of Jupiter's satellites. Greenwich Observatory founded.

1682. Newton, who had laid aside his theory of gravitation when he found it not capable of verification by taking the best measures of the earth in use, hears of Picard's more accurate measurement, tries it, and finds a remarkable degree of nearness to the result deduced from his celebrated law.

1684. Cassini discovers Saturn's first and second satellite.

1687. Newton publishes the "Principia."

1689. Roemer first used the transit instrument: that is, fixed a telescope in the meridian for the purpose of observing transits.

1693. Halley discovers the acceleration of the moon's mean motion.

1705. Halley first predicted the return of a comet, viz. that of 1758.

1715. J. Cassini discovers the divisions of Saturn's ring.

1725. Flamsteed's "Historia Cœlestis" published.

1727. Bradley discovers aberration. Death of Newton.

We have now brought the history to a most remarkable epoch. The great comparative perfection of instruments, the invention of the telescope, of the micrometer, of the clock, of logarithms, the introduction of algebra, the invention of fluxions, and the establishment of the theory of gravitation, in England at least, were so many steps each of magnitude unequalled in former times. But the most meritorious labours are not those which make most show. It takes as much space to say that Cassini discovered a satellite of Saturn as that Flamsteed published the "Historia Cœlestis;" but the first might have been left to the present day without much loss, whereas the latter was a new era in sidereal astronomy. It would have done more for astronomy than the "Mathematical Syntax" of Ptolemy, had it been similarly circumstanced; that is, the work of Ptolemy contained only a simple account of what had been done before, with no material improvements either in methods or instruments; whereas that of Flamsteed contained both, and gave a catalogue of stars such as had not been published before.

The distinct part of Newton's great discovery, which is seldom well understood by any who have not studied it, is —not the notion of attraction, which had occurred to many among the ancients, and to Borelli, it is stated, and Hook among the moderns—not the law, which had been suggested by Bouilland or Bullialdus—but the *proof* that the mechanical deductions from this law of attraction really do represent the celestial phenomena; a combination of improvements in mechanics and mathematics which none but the inventor of fluxions could have made, and a specimen of sagacity which it needed the author of the "Optics" to display. Still less is it true, as many believe, that the Newtonian theory is the Copernican, when they speak of Newton as the establisher of the latter. After what we have said, it is unnecessary to discuss this further

than to observe that it was Galileo who destroyed the mechanical objections to the notions of Copernicus, by the sound system of dynamics of which he was the inventor, and who re-enforced the notions of Copernicus by arguments of the most forcible character drawn from probability. But it was Bradley who, by his discovery of *aberration*, furnished the direct and unanswerable proof of the earth's motion; and it is a coincidence worth remembering that the year of the death of Newton was that of this remarkable accession as well to physics as to practical astronomy.

The interval between the death of Newton and the present time may be divided into two parts—the first reaching to the end of the century, abounding in magnificent discoveries both of analysis and observation; the remainder more distinguished by efforts to extend, correct, and methodize the results of the first.

1731. Hadley's quadrant invented.

1732. The introduction, by Maupertuis, of the Newtonian theory into France. Wright's Lunar Tables.

1745. Bradley discovers nutation.

1749. Euler's and D'Alembert's researches on precession, D'Alembert's on nutation, Clairaut's on the motion of the lunar apogee. Halley's Tables.

1751. Lacaille goes to observe at the Cape of Good Hope.

1752. Lacaille measures an arc at the Cape.

1758. Dollond's achromatic object-glass. Clairaut and Lalande's researches on Halley's comet.

1761. Transit of Venus.

1763. Lacaille's catalogue of southern stars.

1765. Harrison gains the parliamentary reward for his chronometer.

1767. First publication of the "Nautical Almanac."

1769. Transit of Venus.

1774. Maskelyne's observations on local attraction at Schehallien.

1781. Herschel discovers the new planet now called Uranus.

1784. Laplace's researches on the stability of the solar system, on the relation between the longitudes of Jupiter's first three satellites, and on the great inequality of Jupiter and Saturn. General Roy measures a base on Hounslow Heath for the connection of the observatories of Paris and Greenwich. Herschel's Catalogue of Nebulæ.

1787. Laplace's theory of Saturn's ring, and explanation of the acceleration of the moon's mean motion. Herschel discovers two satellites of Uranus. Legendre and General Roy finish the connection of the observatories of Paris and Greenwich. Beginning of the trigonometrical survey in England. Herschel's first observations with his forty-foot telescope.

1789. Herschel measures the rotation of Saturn, and discovers the first and second satellites of Saturn.

1790. Herschel determines the rotation of Saturn's ring, and discovers two more satellites of Uranus.

1792. Beginning of the French survey.

1794. Herschel discovers the fifth and sixth satellites of Uranus.

1795. Herschel's observations on variable stars, and separation of the milky way into stars.

1796. Establishment of the French Institute. Herschel gives strong presumptions that the rotations of Jupiter's satellites are of the same duration as their orbital revolutions.

1797. Laplace's theory of tides.

1798. Cavendish demonstrates and measures the mutual attraction of metal balls, and finds the earth's density.

1799. Commencement of the "Mécanique Céleste."

1801. Piazzi discovers the planet Ceres.

1802. Olbers discovers the planet Pallas.

1803. Herschel observes the changes in the position of double stars.

1804. Harding discovers the planet Juno.

1806. Completion of the French survey by Méchain and

Delambre. Herschel suspects the motion of the whole solar system towards the constellation Hercules.

1807. Olbers discovers the planet Vesta.

1814. Piazzi's catalogue of 7046 stars.

1818. Pons discovers a comet of short period, now called by the name of Encke.

1845. Encke discovers Astrea between Jupiter and Mars.

1846. Discovery of the planet Neptune. The discovery of this planet was unquestionably one of the greatest triumphs which scientific astronomy ever achieved. From irregularities observed in the motion of the planet Uranus, it had been conjectured that some disturbing cause, not discovered, was acting upon it. Two astronomers, M. Le Verrier, in Paris, and Mr. J. C. Adams, of Cambridge, independently of each other, calculated where this disturbing cause must be situated. The results of Mr. Adams' investigations were first completed, but those of M. Le Verrier were first made public; and acting on his information Dr. Galle, of Berlin, detected the new planet at the first search, 23rd September, 1846, within a very short distance of the place assigned for it by Le Verrier.

The progress of astronomy during the last forty years has consisted chiefly in the discovery of a very large number of asteroids or small planets (these are now over 220), and there is every prospect of still further additions; in the predicted returns of comets of short periods; in the successful application of photography to the sun and moon; and above all, in the marvellous results obtained by the system of spectrum analysis in ascertaining the substances of which the sun and other heavenly bodies consist. Admirable and extensive catalogues of stars, double stars, and nebulae have been made, and the optical and other instruments in use have been brought as near perfection as possible. The various branches of astronomy are dealt with in the following articles:—*ABERRATION, AEROLITES, COMETS, CONSTELLATIONS, DECLINATION, EARTH, ECLIPSE, ECLIPTIC, EQUATOR, EQUATORIAL, GRAVITATION, JUPITER, MARS, MERCURY, MERIDIAN CIRCLE, MILKY WAY, MOON, NEBULÆ, NEPTUNE, NUTATION, PARALLAX, PLANETS, POLE, PRECESSION OF EQUINOXES, REFRACTION, RIGHT ASCENSION, SATURN, SOLAR SYSTEM, SPECTRUM ANALYSIS, STAR, SUN, TELESCOPE, TIME, TRANSIT INSTRUMENT, URANUS, VENUS, ZODIACAL LIGHT.*

(Sir John Herschel's "Outlines;" Arago's "Popular Astronomy;" Whewell's "History of the Inductive Sciences;" Grant's "History of Physical Astronomy;" Laplace's "Mécanique Céleste;" Delambre's "Astronomie;" Jahn's "Geschichte der Astronomie;" Maedler's (German) "History of Astronomy;" Proctor's "Lectures on Astronomy;" Newcomb's "Popular Astronomy;" "Elementary Lessons in Astronomy," by J. Norman Lockyer.)

ASTURIAS, one of the ancient provinces of Spain, remained in 1833 OVIEDO, from its chief town, though its older designation is still commonly used. It lies along the Bay of Biscay, having the provinces of Leon on the S., Galicia on the W., and Santander on the E. The total area is 3686 square miles. The surface is much diversified, the whole district being almost hemmed in by a chain of high mountains—a branch of the Pyrenean system—offshoots from which are thrown out in all directions. These mountains gradually diminish in height as they approach the coast, along which there are some narrow tracts of level country. The district is naturally well watered by numerous streams and rivers, but their courses are short, rapid, and subject to floods. The most important river is the Nalon, or Pravia. The coast of Asturias is exceedingly bold and rocky, and along its whole extent—130 miles—there is not one easily accessible harbour; but some trade is carried on at the ports of Gijón and Ribade Sella. The mountainous part of the district is covered with extensive forests of valuable timber, including chestnut,

oak, and beech. Chestnuts form an important part of the food of the population.

The broken character of the surface prevents anything like extensive agricultural industry, but in the valleys abundant pasturage is found for numerous horned cattle, pigs, and horses. The latter are of small size, but distinguished for their strength and swiftness; they are also noted for their gentleness, and are considered in these respects the best in Spain. Wild deer, foxes, wolves, and hares are not uncommon in the mountains. Both the seas and rivers produce the most delicate fish in the country—notably salmon and lampreys—which are caught in considerable quantities and sent to Madrid.

The climate is damp, and in the mountainous parts frequently severe; but along the valleys and on the sea coast it is mild and temperate, so that orange and lemon trees grow in the open air. Fruit is very plentiful, and large quantities of chestnuts, apples, and pears are produced. The vine is not much cultivated, and cider is the common beverage.

Wheat is a rather uncertain crop, the soil and climate being better adapted for the production of rye and maize; and these form the principal food of all but the higher classes.

The inhabitants are an extremely frugal and moderate race; they are robust, patient, and hardy, unenterprising but laborious, hospitable to strangers, and enthusiastic lovers of their country. Some hardware and copper utensils are made, but the manufactures are unimportant. Coal mines are extensively worked, and from them Cadiz, Carthagena, and other ports in the Mediterranean are supplied. Iron ore, copper, lead, zinc, antimony, jet, amber, marble, and millstones are also obtained from this district.

There is a railway from Gijon to Langres, about 25 miles inland, where there are mines; but, generally speaking, the highways are very unsatisfactory, only a few of the passes across the mountains being practicable for carriages, and most of them are difficult even for horses. There is, however, one splendid road from Gijon to Leon and Madrid, which is called the *camino real*, or royal highway. It is carried by means of bridges and embankments over every impediment of a rugged and mountainous country, and in consequence of its great cost Charles V. is said to have inquired if it were paved with silver.

Asturias may be said to be the cradle of Spanish independence, and several peculiar privileges have been conferred on the inhabitants of this province on account of the services it has rendered to the monarchy. The ancient *Astures* ("highlanders") were the first natives of the peninsula to submit to the Roman yoke, being only subdued in the reign of Augustus. When the Saracens overran the rest of the country, those who escaped the sword of the invaders sought an asylum in the fastnesses of the Asturian mountains, and headed by Pelayo, defied the power of the victorious crescent. Pelayo was proclaimed king of the Asturias in 718, and his successors having extended their conquests they assumed the title of kings of Leon in 914. In 1388, the Infante Don Enrique, the eldest son of Juan I., was styled *Principe de Asturias*, from which period the eldest sons and daughters of the kings of Spain have taken that title. The Asturias speak the Castilian language.

ASUNCION or **ASSUMPTION**, the capital of the republic of Paraguay, in South America. It is built on rising ground near the left bank of the river Paraguay, and in the midst of a fertile territory. The inhabitants carry on a considerable trade in hides, tobacco, molasses, rum, sugar, and Paraguay tea or *yerba maté*. During the war between Paraguay and the neighbouring states, in 1869, Asuncion suffered severely, for after having been bombarded from the river it was taken and plundered by the Brazilian forces.

ASY'LUM, the Latin and English form of the Greek *Asylon*, which signifies a place of refuge (*a*, privative; *sylo*, right of seizure). The tradition was that Romulus made an asylum on the Palatine Hill. Plutarch tells us that he dedicated the place to the god Asyleus ("Romulus," 9).

In the Grecian states the temples, or at least some of them, gave protection to all who fled to them, even although they had committed the worst crimes. The practice seems to have been that they could not be dragged from these sanctuaries; but they might be forced to come out by being prevented from receiving food (Thucydides, i. 126, 134). Eventually these places of refuge became great mischiefs, especially in the Greek cities. In the time of the Emperor Tiberius an attempt was made to repress this evil by an order of the senate, directed to all the pretended asylas, to produce legal proofs of the privilege which they claimed (Tacitus, "Annals" iii. 60, &c.)

The complaint of the abuse of asylas, which is recorded by Tacitus, refers only to Greek temples. If the practice existed in Roman temples, it may be inferred that it was not so extensive. Under the empire, however, it became a practice to fly for asylum to the statues or busts of the emperors ("Dig." 48, tit. 19, s. 28, § 7). A constitution of Antoninus Pius declared that if a slave in the provinces fled to the temples or the statues of the emperors to escape the ill-usage of his master, the governor of the province might compel the master to sell him (Gaius, i. 53).

The practice of Christian churches being used as asylas is said to date from the conversion of Constantine the Great (A.D. 325). The asyla thus established eventually grew throughout all Christendom to be an intolerable abuse. Not only churches and convents, with their precincts, but even the houses of the bishops, obtained the privilege of sanctuary. (This use of the word sanctuary appears to be peculiar to the English language.) Though criminals were thus frequently rescued from justice, protection was also sometimes afforded to the innocent, who would not otherwise have been enabled to escape the oppression or private enmity which pursued them under the perverted forms of law. The institution was one of the many then existing, which had the effect of throwing the regulating power of society into the hands of the clergy. The church maintained a long and hard struggle in defence of this privilege. In England it was not till the year 1187, in the reign of Henry VII., that by a bull of Pope Innocent VIII. it was declared, that if thieves, robbers, and murderers, having taken refuge in sanctuaries, should sally out and commit fresh offences, and then return to their place of shelter, they might be taken out by the king's officers. By an Act of Parliament passed in 1531 persons accused of treason were debarred the privilege of sanctuary. After the complete establishment of the Reformation, in the reign of Elizabeth, neither the churches nor any other sanctuaries were allowed to become places of refuge for either murderers or other criminals. But various buildings and precincts in and near London continued for a long time afterwards to afford shelter to debtors. In 1697 all such sanctuaries, or pretended sanctuaries, were finally suppressed by 8 & 9 Will. III. c. 26.

Both in this country and in America the name of asylum is commonly given to benevolent institutions intended to afford shelter to some particular description of the merely unfortunate or destitute, and particularly to those hospitals in which the insane are confined.

The Jewish cities of refuge established by Moses and Joshua are the most remarkable instance on record of a system of asylum founded and protected by the state itself for the shelter of persons who had violated the law. These cities, as we are informed in the twentieth chapter of the Book of Joshua, were six in number, three on each side of the Jordan.

ASYMPTOTE (Gr. *asumptotos*), a compound word

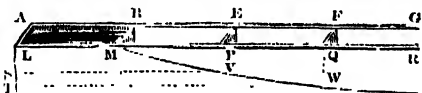
signifying "which does not fall with;" if taken literally with respect to two lines, it would mean that they do not meet one another. But it is used only in speaking of two lines (one of which at least must be curved) which continually approach each other, but never meet; so that the distance between them diminishes without limit, or they may be brought to any degree of nearness, without ever actually meeting.

This appears a paradox to beginners in geometry, who are generally unable to imagine it possible that two lines should continue to approach one another for ever without absolute contact. But this arises from their confounding



the thing called a straight line in practice (which is not a straight line, but a thin stroke of black lead or ink, as the case may be) with the straight line of geometry, which has neither breadth nor thickness, but only

length. And they also see that, if two lines might be asymptotic, the fact might be made visible, which is impossible, unless the eye could be made to distinguish any distance, however small. But if the unassisted eye cannot detect a white space between two black lines, unless that space be a thousandth of an inch in breadth, which is about the truth, it is evident that two geometrical surfaces with asymptotic boundaries, such as $A B C, D E C$, would appear to coincide from the point where the distance between them is about the thousandth part of an inch. The idea of a geometrical asymptote is therefore an effort of pure reason, and the possibility of it must be made manifest to the mind, not to the senses. $A L M B C D$ is a vessel of water, of which the sides and bottom are extended indefinitely towards C and D ; the end $A L$ is fixed, but the end $B M$ is movable paral-



lel to its first position, so as always to form a water-tight obstacle; by which means the length of the vessel may be increased to any extent, while its breadth and height remain the same. Let the water be a perfect fluid, without any adhesion to the sides of the vessel (which is conceivable for purposes of mathematics, though not physically possible), and let the bottom of the vessel be geometrically horizontal; then, as the end $m n$ changes its position and moves towards $c k$, it is manifest that the vessel will grow larger, and the level of the water will fall. Suppose the side $l k$ to be of glass. Thus when the vessel ends at $t r$, the water may stand at $s v$; when the end is at $p q$, the water may stand at $t w$, and so on. But the level of the water never can fall absolutely to the bottom $c k$; for so long as the preceding mathematical suppositions hold good, and there is some water in the vessel, it must stand at some determinate height above the bottom. As the end $m n$ moves to the right, let the curve $m v w$, &c., mark out the positions of the level upon the edge of the moving end, as is done in the diagram. Then, for the reason above given, this curve never can meet the line $c k$, though obviously in a state of continual approach towards it. Hence the curve $m v w$ and the line $c k$ are asymptotes. See also CONIC SECTIONS.

ASZOD, a market town of Lower Hungary, about 23 miles N.E. of Pesth. The inhabitants are industrious, and carry on considerable trade in sheepskin cloaks, and in corn

and wine, the produce of the delightful valley in which the town is situated. Aszod contains two churches, a synagogue, and 4800 inhabitants.

ATACA'MA, a province of Bolivia, in South America, and also one of Chili--the dividing line being the twenty-fourth parallel of S. lat., according to the treaty of 1866. The Bolivian province has an area of 70,000 square miles, and comprehends all the country of that republic which lies to the west of the Andes along the Pacific Ocean; its northern boundary being formed by the river Loa, and its southern by the river Salado, so flat it extends along the coast upwards of 210 miles, with a breadth of from 25 to 40 miles. It is divided into the Upper (Sierra) and Lower country. The Sierra comprehends that part of its surface which lies on the N.E. within the chain of the Andes, and contains some fertile valleys, in which the common fruits and seeds of the South American sierras are cultivated. The surrounding mountains contain some exceedingly rich silver and copper mines--those of Caracoles being amongst the most productive silver mines in the world. The Lower country presents over nearly all its surface nothing but an uninhabited and uninhabitable desert, consisting of a rocky and rugged tract with the merest patches and strips of vegetation. The southern part is known under the name of the Desert of Atacama. In this region sand spouts are of frequent occurrence. Towards the boundary of Peru a few rivers descend from the Andes, and along their courses valleys extend, in which there is a rich vegetation, the soil producing bananas, cotton, figs, vines, and other fruits and vegetables. The most considerable of these rivers is the Cobiá.

The area of the Chilean province of Atacama is about 38,000 square miles, and it is also one of the richest silver and copper districts in the world. Lead and zinc are likewise found, and sulphur, alum, and salt are abundant. The capital is Copiapo, and the chief port is Caldera. The railway connecting the two places was the first constructed in South America.

ATAHUALPA was the son of Huayna Capac, the eleventh Inca of Peru, by a princess of Quito. According to the laws of Peru the Incas were only allowed to marry their sisters, or some other female of their own family; every other union was considered unlawful, and the fruit of such a union illegitimate. Atahualpa could not, on this account, succeed his father. Huayna Capac, however, desired on his death-bed that Atahualpa should succeed him on the throne of Quito, and Huascar, the hereditary prince of Peru, acquiesced in the will of his father. In 1523 Atahualpa ascended the throne of Quito, and immediately commenced a course of treachery against his brother, whom he took prisoner, and an immense number of whose adherents he cruelly put to death.

In the midst of these civil discords the Spaniards arrived in Peru. Atahualpa's ambassador was civilly received by Francisco Pizarro, who, on his part, sent his brother Hernando to visit Atahualpa, to offer him his friendship. On the following day Atahualpa, accompanied by 8000 men, unarmed, went to visit Pizarro. On his arrival, Father Valverde, in a long harangue, endeavoured to acquaint the Inca with the doctrines of the Catholic religion, and declared to him that his kingdom had been given by the pope, the vicar of God, to the mighty Emperor Carlos, and that consequently he was bound to surrender it, otherwise both he and his subjects would be destroyed by fire and sword. The Inca answered by his interpreter that, comparing the tenor of their former with their present discourse, he could infer nothing else but that both they and their king were either tyrants who went about the world plundering and usurping the kingdoms of others, or a scourge sent by God to punish mankind. The Spaniards, it is believed according to a preconceived treachery, did not suffer the Inca to finish his discourse. The cavalry fell

upon the unarmed multitude, sabring and trampling under the feet of their horses old men, women, and children, and Atahualpa was seized and made prisoner.

Atahualpa offered Pizarro, for his ransom, to fill the room in which he was, to as high as he could reach, with gold and silver and precious metals. Pizarro agreed to this proposal, and the Inca gave the necessary orders for procuring the ransom. Atahualpa, though imprisoned, was in communication with his generals, and ordered them to remove his brother to Junja. Here Huascar saw two officers of Pizarro, and outdid Atahualpa in his lavish promises, which circumstance having reached the ears of Atahualpa, he ordered him to be put to death.

On a subsequent accusation of having secretly given orders to his subjects to arm against the Spaniards, the Inca was brought to trial. Some of the Spanish officers, whose names are mentioned by the historian Garcilaso, remonstrated against the injustice of such proceedings; but they were overruled, and Atahualpa was tied and condemned to be burned alive on several false and ridiculous charges, the chief of which were the one above mentioned, and the murder of his brother. On his way to the place of execution he consented to be baptized, in consequence of which he was strangled only.

ATALANTA, a beautiful Arcadian girl, one of the heroines of Greek mythology, dear to Artemis, who had preserved her in her infancy when her father had cast her out upon the hillside to die, because of her sex. She grew up the most swift footed of mortals, and when she had become famous by her skill in hunting [see MELEAGER] and by her bravery in protecting herself against the attacks of centaurs and others who pursued her, she was recognized and received by the king her father. He wished her to marry; but as she had always been devoted to the service of the virgin-goddess Artemis, and as an oracle had warned her against marriage, she managed to elude her father's wish by stipulating that any suitor for her hand should first vanquish her in a foot-race. The young Meilanion fell in love with her, and sought the help of Aphrodite. The goddess of love consented to aid him, and gave him three golden apples to cast before Atalanta while racing. As expected, the beauty of the unusual fruit was too tempting to be resisted; and each time, as Atalanta stooped to pick up the apple, Meilanion gained a good start in the race. Judiciously reserving the last, he was enabled to check Atalanta so near the goal as to reach it before she could overtake him, and to be able, on her own terms, to claim her as his wife. Wandering together amongst the groves of the temple of Zeus, they profaned the sanctuary by their embraces, and were changed into lions by the angry god.

The story of Atalanta is the frequent theme of poet and painter. Amongst modern poets, Mr. Swinburne's masterpiece of verse, "Atalanta in Calydon" (the expedition with Meleager against the boar), is almost rivalled by Mr. W. Morris' charming verse-tale in "The Earthly Paradise" (the race of Meilanion). A painting by Mr. Poynter, R.A., excited universal admiration on its exhibition a few years since. The stooping Atalanta, her light garments whirling in the sudden stop of her running, and the eager, dark Meilanion just passing her, urged on by the favouring shouts of the bystanders, filled the mind with a sense of swiftness and excitement, and formed a striking picture, thoroughly in the spirit of the delightful myth.

ATAVISM, or *Reversion*. When different breeds of animals or plants are crossed, the offspring frequently exhibit peculiar characters, which neither of the parent breeds possesses, but which are evident in the common ancestor of these breeds. Darwin tested this in various ways; for instance, he paired a black Spanish cock and a white silky hen, two ancient and pure breeds, in which there was no trace of the red colour natural to the plumage of the Himalayan *Gallus bankiva*, supposed

to be the original of our domestic fowls. The offspring showed, in many cases, the peculiar orange-red colour of the remote ancestor. This phenomenon is known by the name either of *atavism* or *reversion*; but Quatrefages, one of Darwin's chief opponents, who contends that a species is something more than a far-gone variety, uses the terms in different ways. *Races* of the same species, or breeds, have a *mongrel* offspring which exhibit *atavism*, as already illustrated. *Hybrids* are the result of crossing two different species; and when a hybrid female is crossed with a male of the pure species, the offspring, after two or three generations, invariably *reverts* to the character of the species to which the male belongs, without any tendency to vary, or assume the characters of the other parent. Thus, Quatrefages says, it is impossible to get a new breed by crossing two species. This revival of long-lost characters is one of the most puzzling phenomena of heredity. Owen treated of it in his essay on "Parthenogenesis," Herbert Spencer in "Principles of Biology," and Darwin in his theory of Pangenesis advanced in "Variation of Animals and Plants under Domestication."

ATAX. See ACARIDÆA.

ATBARA (*Bahr-el-Azrad*, or "Black River," so called from the large quantities of black earth which it carries down from the mountains) is an important river in Eastern Africa, which rises in the mountains of Abyssinia and falls into the Blue Nile at El Damer, after a N.N.W. course of about 300 miles. During the dry season it is a comparatively insignificant stream for about half its length.

ATE, the goddess of mischief, among the Greeks. She it was who led rash men into inconsiderate actions. Nay, once she induced Zeus, at the birth of HERACLES, to swear the fatal oath that whatever descendant of Perseus should be born that day should rule the race. Hera arranged matters so that Eurystheus was born first; and as a result the great Hercules, son of Zeus himself, served the greater part of his life in bondage to Eurystheus. The goddess was thus avenged for her consort's unfaithfulness; but he, furious at the trick, hurled Ate from Olympus for ever, and she fell to earth, to curse men alone. Æschylus modifies her nature almost into that of NEMESIS, but in Homer nothing can be more distinct than the relentless, passionless avenger Nemesis from Ate, the mischief-making daughter of Eris (Discord).

The Litæ, sisters of Ate, are described by Homer as lame, wrinkled, and squinting (Iliad ix. 502, &c.); but such deformities become lovely to us when we learn that they arise from the perpetual trouble these beneficent goddesses are thrown into in their unceasing efforts to set straight the evil done by Ate. (Litæ means "prayers," and perhaps Homer is here indulging in allegory.)

A'TELES, an abbreviation of *Atelochirus* (Gr. *atēlis*, imperfect; and *cheir*, a hand), is the name given to the spider monkeys of South America, from the fact that the thumbs of the hands are rudimentary, and in some species not externally apparent.

In the genus *Ateles*, which includes the spider monkeys, the head is round, the face moderately developed, the limbs are very long and slender. The tail is longer than the body, thick at the base, strongly prehensile, and naked for a considerable space along the under surface at its extremity. The ears are moderate and naked, with reflected margins. The fur is long, crisp, or harsh, sometimes silky; and the prevailing colour is black. The spider monkeys are staid, gentle, timid, and exhibit an air of listlessness, which is thrown off only under excitement.

On the ground, which is not their proper place, the spider monkeys, from the length and slenderness of the limbs and the flexibility of the joints, display but little address. Their motions on all-fours are crawling and indeterminate. They tread on the inner edge of the hands, and to a great degree on the inner edge of the feet, and

en leavonr to assist themselves by attaching the tail to every object within reach. In captivity, however, they often assume the erect attitude, and walk thus better than any other of the long-tailed monkeys. When proceeding in this manner the tail is elevated as high as the shoulders, and then bent down at its extremity, and is so managed as to act as a balancer, while the animal moves steadily along. But the proper place of these monkeys is among the branches of the forest; there their movements are rapid, easy, and unconstrained; their progression is by a series of swinging evolutions, in the performance of which the limbs and tail take an equal share. The strength and prehensile powers of the latter organ are very great, and enable these animals to assume the most varied attitudes. In ascending or descending trees, or in traversing the branches, the tail is in continual requisition; they coil it round branch after branch in their passage, turning it in various directions, and applying it with no less strength than precision. They often suspend themselves by it exclusively, and swinging until a sufficient impetus be gained, launch themselves to a distant branch, or stretching out their arms seize it as they vibrate towards it. They are, in fact, essentially swingers and not leapers among the branches. The advantages of this additional instrument of prehension are palpable; its sense of touch is finger-like; and it is capable, like the proboscis of the elephant, of seizing small objects with great address.

Charles Kingsley gives the following description of a spider monkey he saw in Trinidad:—"The queen of all the pets is a black and gray spider monkey (Ateles) from Guiana, consisting of a tail which has developed, at one end, a body about twice as big as a hare's; four arms (call them not legs), of which the front ones have no thumbs, nor rudiments of thumbs; and a head of black hair, brushed forward over the foolish, kindly, greedy, sad face, with its wide, scapious, beseeching eyes, and mouth which, as in all these American monkeys, as far as we have seen, can have no expression, not even that of sensuality, because it has no lips. Others have described the spider monkey as four legs and a tail, tied in a knot in the middle; but the tail is, without doubt, the most important of the five limbs. Wherever the monkey goes, whatever she does, the tail is the standing point, or rather hanging point. It takes one turn at least round something or other, provisionally, and in case it should be wanted; often, as she swings, every other limb hangs in the most ridiculous repose, and the tail alone supports."

These essentially arboreal animals are natives of Guiana, Surinam, Peru, and Brazil, and abound in the mighty forests which skirt the great rivers and their tributaries for hundreds of miles in one unbroken continuance.

Like the other American monkeys, they are killed by the natives for food. They are skinned, and roasted over a wood fire; and though relished by the Indians, few Europeans, unless constrained by necessity, can force themselves to partake of such a revolting dish. The flesh is dry and lean.

Like the monkey tribes in general, these spider monkeys live in troops, and act in concert either in retreating from danger or in opposing an enemy. When one is wounded it becomes an object of solicitude, and is assisted by all its companions.

The best known of the Ateles is the *Coiata paniscus*. This animal measures about 2 feet in length to the root of the tail, and is covered with long, coarse, black hair, except upon the face and the under part at the groin. In captivity it soon becomes tame, and displays considerable intelligence. It is found principally in Surinam and Brazil. (See Plate QUADRUMANA.)

ATELIERS NATIONAUX, or National Workshops, were institutions set up by the provisional government of France in February, 1848, to provide for the unemployed workmen. Starting from a principle that all workmen

were entitled to the means of living, it was argued that as the competitive system of ordinary trade often left large numbers out of work, and caused great variations in the rate of wages, it would be a good plan to find work for all who offered at a uniform rate of pay. The government did not attempt to suppress private employment of labour, but it offered such terms that most large employers closed their establishments, and the workmen flocked in large numbers to the national workshops. Private trade was thus almost ruined, while the government found they had over 100,000 workmen to be paid and provided for, and that there were no means of doing this. It was also found that when work was given out the men, being deprived of all stimulus to labour by the certainty of the employment and the uniform rate of wages, shirked their work, and accomplished very little. The experiment thus proved a complete failure, and was abandoned after a trial of about three months. The closing of the shops, however, led to severe conflicts between the disappointed artisans and the soldiery, in which hundreds of lives were lost, and order was obtained by the restoration of despotism.

Opposed to all laws of political economy, these institutions were of necessity destined to fail; but the experiment has left some valuable lessons for the consideration of all those who seek to supersede the ordinary method of competition by elaborate schemes of organized and equalized labour.

ATELLANÆ FABULÆ, a species of comedy which was common among the people of Campania, and was thence introduced at Rome. The town of Atella, near Capua, gives this branch of comedy its name. The Atellan farces had Oscan characters, or actors speaking the Oscan dialect, who were the representatives of some peculiar class of people of that country, much in the same manner as the Arlecchino and Polcinello of the Italian stage are caricatures of the peculiarities of certain classes in their respective provinces, and speak their several dialects. Indeed these *maschere*, as the Italians call them, may be considered as the descendants of the old Oscan characters in the Atellanæ. The Atellanæ were a mixture of high and low, pathetic and burlesque. They were distinct from the performances of the *mimi*, who indulged in scurrilities and in obscene jokes and gestures. Their humour dealt chiefly in ingenious allusions and equivocations clothed in decent words. The Atellanæ were performed by Roman citizens. In course of time, however, the Atellanæ degenerated; common mercenary players appeared in them, and they became as loose in their language as the performances of the *mimi*. This may explain the different judgments given of the Atellanæ by different writers.

The Atellanæ were written in verse, chiefly iambic. Lucius Sulla, the dictator, is said to have written Atellanæ. Quintus Novius, who flourished soon after Sulla's abdication, wrote about fifty plays of this kind; the titles of some of them have come down to us, as "*Mæchus Exul*," or "*Mæchus in Exile*;" "*Vindemiatores*," or "*The Vintagers*." Lucius Pomponius of Bononia, who lived about the same time, wrote "*Mæchus Miles*," or "*Mæchus the Soldier*," and others.

(Sealiger, "Poet." lib. i.; Pitiscus, "Lexicon Antiquit.;" Smith, "Diet. Antiq.")

A TEMPO, in music (Ital. "in time"), is used after any change, by retardation or acceleration, when the original speed of the movement is to be restored.

ATH or **AATEL**, a flourishing manufacturing town in the Belgian province of Hainault, on the Dender, and 32 miles by railway from Brussels. It was strongly fortified by Vanbau in 1667, and strengthened in 1815, but the works were finally demolished in 1830. The Hotel de Ville is a handsome building, and the Church of St. Julian is also much admired. The manufactures are caps, hats, gloves, cotton and linen cloth. It also carries on some

trade in grain, and in the products of the neighbouring country, among which are tobacco, poppies, and rape. The population is 9000.

ATHABASCA, a river and lake in British North America. The Athabasca River has its sources in the Rocky Mountains. It flows generally N., but sometimes E., and in its windings receives the waters of the Lesser Slave Lake by its outlet the Lesser Slave River; it is also joined by the Pembina, S.W. end of the Red Deer, Clear Water, and Red Willow Rivers. The Athabasca River falls into the Athabasca Lake, nearly opposite Fort Chipewyan, a trading station established by the Hudson's Bay Company. In the upper part of its course the Athabasca is called La Biche Rivière. Athabasca Lake is situated about 170 miles S.S.W. of the Great Slave Lake. It is of an elongated shape, lying in a direction nearly E. and W. It is about 230 miles long; its width varies from 30 to 15 miles, gradually decreasing towards its eastern extremity.

ATHALIAH (whose name means "whom the Eternal remembered") is considered to be the daughter of Ahab, king of Samaria, and of his wife Jezebel, the daughter of Ethbaal, king of the Zidonians. She is also called the daughter of Omri, who was the father of Ahab; but by comparing the various passages, it seems that she was the daughter of Ahab, and granddaughter of Omri.

Athaliah became the wife of Jehoram, king of Judah. He died in the year B.C. 885, and the kingdom devolved upon Ahaziah, his youngest son, who reigned one year. Athaliah, who possessed much influence in the government of her son, used it for bad purposes. On the untimely death of Ahaziah, "she arose and slew all the seed-royal of the house of Judah." Athaliah ascended the throne which she had thus rendered vacant B.C. 884, and reigned during six years, when Joram, the son of Ahaziah, who had been concealed, was produced to the people by Jehoiada, the high-priest, and by him anointed king. Athaliah endeavoured to excite a reaction in her own favour, but in vain; for Jehoiada gave orders that she should be removed from the sacred inclosure and slain. The command was immediately obeyed. B.C. 878. (See 2 Kings ix. 24; xi.; 2 Chron. xxi. 5, 7-12; xxii. 2-10; xxiii.) The story of Athaliah has been used by Handel as the subject of an oratorio; and it forms the subject of Racine's tragedy "Athalie," to which Mendelssohn wrote his famous incidental music.

ATHANARIC, a chief of the West Goths, who had settled themselves on the borders of the Roman empire, in Dacia, north of the Danube, about the middle of the fourth century. Having aided Procopius in his rebellion, the Goths were attacked and defeated by the Emperor Valens in 369. They then sued for peace, and an interview took place on this occasion between Valens and Athanaric, in a boat in the middle of the Danube. Some years afterwards the Huns threatened the territory of the Goths, and Athanaric opposed the barbarians at the passage of the river Dniester, but he was obliged to retire with a part of his followers into the Carpathian Mountains. The rest of the Goths, under Fritigern, threw themselves on the empire for protection, and were allowed to cross the Danube and settle in Thrace. They afterwards quarrelled with the Emperor Valens, whom they defeated and killed in the battle of Adrianople, in August, 378. After the death of Fritigern, and the elevation of Theodosius to the empire, Athanaric was elected king of the Goths. He concluded a peace with Theodosius, and went to Constantinople, where he was received with great pomp, in January, 381; but having surfeited himself at the emperor's table, he soon after died, and was buried with great magnificence by order of Theodosius (Gibbon, c. xiv.).

ATHANASIAN CREED is an exposition of Christian faith, the date of the composition of which has given rise to much controversy. Baronius states that it was written

by St. Athanasius whilst at Rome, but it is concluded from internal evidence that it was composed about the middle of the fifth century.

Before the close of the sixth century the Athanasian Creed had become so well known that commentaries were written upon it; it was not, however, then styled the Athanasian Creed, but simply the Catholic Faith. Before the expiration of another century it had obtained the appellation which it has since preserved. It is supposed to have received the epithet "Athanasian" on account of its reference to the subjects of the controversy between the orthodox and the Arians.

From the seventh century we find that the Athanasian Creed has been considered in the Western churches to be the most authoritative document regarding the doctrine of the Trinity. Waterland, in his "Critical History of the Athanasian Creed," says:—"The use of it will hardly be thought superfluous so long as there are any Arians, Photinians, Sabellians, Macedonians, Apollinarians, Nestorians, or Eutychians in these parts."

This creed was used in France about the year 850, and was received in Spain and Germany about 100 years later. It is not used in the Episcopal Churches of Ireland or America; and in the English Church, where it is ordered to be read on certain high festivals, its denunciatory tone is obnoxious to a large number of persons.

ATHANASIUS, SAINT, one of the most prominent figures of the fourth century, was born at Alexandria in Egypt, A.D. 296. His writings prove that he had received a learned education, and that he was acquainted with both the theological and the profane literature of his age. During his youth he led for a time an ascetic life with St. Antony. Athanasius early gained the favour of Alexander, bishop of Alexandria, by whom he was employed as secretary. In 325 he was archdeacon, and represented his bishop at the Council of Nicea, where he laid the foundation of his fame by his powerful refutation of Arianism. On the death of Alexander, in April, 326, Athanasius was unanimously chosen to succeed him in the bishopric by the orthodox prelates and the citizens. He thus obtained the first rank in the church after the Bishop of Rome, and the highest ecclesiastical dignity in the East.

In the leaders of Arianism Athanasius had many opponents. Among the most formidable of these was Eusebius, bishop of Nicomedia, who had obtained considerable influence at the court of Constantine. On the return of Arius from exile in 327, Athanasius declined to comply with the proposal of Eusebius, backed by an imperial mandate, to readmit Arius to church communion. The Arians therefore left no stone unturned to effect his ruin. From 332 to 336 charge after charge was brought against him at Caesarea, Tyre, and other places; and eventually in the latter year he was sentenced to be deposed from his office, excommunicated, and exiled from Alexandria. The emperor was induced to banish Athanasius to Treves, where he was well received by Constantine. Whilst here he wrote his famous letter to Serapion on the death of Arius. On the petition of the Alexandrians Athanasius was recalled in 338. The Alexandrians received him with unbounded joy; and he at once deposed the Arian bishops, and put orthodox prelates in their place. The Eusebians, who had protested against his return, revived the old accusations, and added the charge of having sold, for his own benefit, the corn belonging to the church and the poor. Athanasius summoned a synod in 340, which was attended by about 100 bishops, who refuted in a synodal letter the accusations of the Eusebians. After this both the contending parties sent messengers to Julius, bishop of Rome, and thus the Western churches became involved in the contest. Julius declared in favour of Athanasius, but, in compliance with the request of the Eusebian delegates, appointed a synod to be held at Rome, whither Athanasius

repaired, attended by a few monks. It is maintained that on this occasion he transplanted the monastic institutions from Egypt into Italy. Before this synod could be assembled at Rome the Eusebians held another at Antioch in 341, which excluded Athanasius for ever from the see of Alexandria. The vacant see was given to Gregory of Cappadocia, who, assisted by Philagrius the Roman governor and the imperial troops, violently expelled Athanasius from Alexandria, where he had meanwhile returned. Athanasius fled for refuge to Rome, whither Julius summoned a fresh synod, which rejected all the charges against him. On the demand of Constant, the emperor of the West, a synod was held in 346 at Sardica, on the confines of the two empires, which acquitted Athanasius of the charges brought against him. It was by this synod of Sardica that the canons were first established which recognized the right of the Bishop of Rome to act as arbitrator in all cases of the deposition of bishops. By means of strong threats Constant induced his brother Constantius, the emperor of the East, to reinstate the orthodox bishops who had been exiled by the Eusebians. In the year 351 Constant died. As long after this event as the pretensions of Magnentius to the empire of the West gave cause of fear, Constantius was the friend of Athanasius; but after the defeat and death of Magnentius in Gaul, the Bishop of Alexandria found himself held as the personal and theological enemy of the emperor. Constantius, anxious for the consent of the Western Church to his proceedings against Athanasius, summoned a synod at Arles in 353, and in 355 another at Milan, which consisted of 300 bishops. By means the most unworthy (Gibbon, chap. xxi.) a majority of votes was obtained, and notwithstanding the fearless defence of his friends, Athanasius was condemned and deposed by both synods, and all bishops who refused to acknowledge the justice of the sentence were immediately banished by the emperor. Alexandria, resisting the decree, was surrounded and entered by the imperial troops. During four months, under the guise of zeal for religion, the most horrible ravages were carried on within the walls of the city. Athanasius saved his life by a rapid and secret flight. A price was set upon his head, but he managed to elude the imperial emissaries for six years. He lived chiefly among the monks of the Egyptian desert; and it was during this period he composed several of his controversial works. Julian, the successor of Constantius, and a pagan, recalled Athanasius; but as he was as bitter an enemy of paganism as of Arianism, Julian soon repented of having recalled him, condemned his proceedings, and pronounced sentence of exile against him. Julian died in 363, and was succeeded by Jovian, who favoured the orthodox views, revoked Julian's decree, and treated Athanasius with great distinction. Jovian's reign, however, was short; he died in February, 364, and was succeeded in the Eastern Empire by Valens, a zealous Arian. Banished by this emperor also, Athanasius lived concealed for several months in his father's tomb. This persecution of the now venerated patriarch excited a rebellion, to put an end to which Athanasius was allowed to resume his episcopal rank and functions. During the short remainder of his life he lived in peace and in the possession of his see. His death took place in May, 372 or 373.

The opinions entertained of Athanasius have been most contradictory. Most extol him for his sanctity; some blame him for obstinacy. He was small of stature, and did not at first impress beholders with the idea of internal greatness. His style is unadorned but appropriate, and bears the stamp of genius and true eloquence. A splendid edition of his writings, most of which relate to the heresies that agitated the church in his time, and to his own persevering struggles for the Christian faith, was published in three vols. folio, by the Benedictine monks of St. Maur (Paris, 1698). This edition contains the Greek text and a Latin

translation. An edition in four vols. folio was published at Padua in 1777. In the "Collectio Nova Patrum Græcorum," by Bernard de Montfaucon (Paris, 1706), two vols. folio, the works of Athanasius are given, with a Latin version and notes. His "Four Orations against the Arians" were done into English by Samuel Parker, two vols. 8vo (Oxford, 1718). Cardinal Newman has translated his defence of the Nicene Creed and some others of his principal writings (Oxford, 1842).

ATHEISM, a word derived from the Greek *atheos* (without God), and used to denote the systems of those who deny the existence of God. Considered historically, it has been frequently used to describe those who rejected the popular theologies of their age, although their own conception of Deity may have been far in advance of the systems they denied. Thus, the ancient Greeks regarded some of their philosophers as atheists because of their repudiation of polytheism; and the same charge was brought against the early Christians because of their rejection of the idols of heathenism. At later periods, after the doctrine of the Trinity had become fully established, the name was frequently given to those who held Socinian or Unitarian views, although such persons were often devout believers in God. The accusation, however, was ever regarded as being the most terrible that could be made, and as of necessity implying mental and moral aberration of the worst kind.

In the intellectual revolt against the prevailing systems of social and ecclesiastical authority that preceded and attended the French Revolution, however, atheism as a speculative theory of the universe and a practical foundation of morals was openly taught.

This fashion has happily passed away; but there are even now to be found, here and there, men (none of any mark) who accept the name of atheist, and teach that there is no God. This is quite distinct from the agnostic position, which denies that mankind has or can have any knowledge of God. The latter is the view of the Positivists and Secularists. Still less can the charge of atheism be fairly brought against the Pantheists, who prefer to regard God as *in* nature rather than as a distinct personality beyond nature. But as before said, the term is usually (except in the isolated cases named) one of mere senseless abuse, applied indiscriminately to any strange religious belief.

On the other hand, it has become the fashion of late in certain circles to denounce as mischievous and even bigoted the designation of a man as an atheist who advocates atheistic opinions. Especially is this reproached when the person so described shrinks the designation himself. But truth and clearness of statement require that we should use that word as properly descriptive of one whose views are opposed to the acknowledgment of "a Supreme Being, the author of all things by free and understanding action." Dr. Martineau, in his "Study of Spinoza" (London, 1882), makes some very pertinent observations on this point. After showing that Jacobi had logical justification for classing Spinoza with atheists, he goes on to say:—"The just abhorrence of intellectual persons for the *odium theologicum*, and the generous rule to give no one a name which he disowns, have nearly banished this word from our vocabulary; and if its disuse by calm and judicious men would save it from abuse by passionate advocates it might well be dropped. But a right use of language is a better corrector of wrong than mere disuse; and, logically, it is as little possible to spare the word *atheist* as the cognate terms of the same group. As there are and always have been people who believe, so there are and always have been people who disbelieve the governance of the world by a 'living God'; and we cannot dispense with a name for each. The duty of applying to no one a term which he disowns is conditioned on his not altering its meaning in order to disown it; the obligation is reciprocal, resting on a common understanding,

and violated by tricks of perversion on either side. The Romans had no right to charge atheism on the early Christians for not believing in Jupiter Capitolinus. On the other hand, it is no valid disclaimer to say, 'I am not an atheist, for I believe in a first cause,' if that first cause should happen to be hydrogen, or other blind element of things. It cannot be desirable that the word 'God' should be thrown into the crucible of metaphysics, and reserved for any *caput mortuum* that may be left when the essential constituents of its meaning have been dissipated."

ATHELING, a Saxon title for a prince of royal blood. It is manifestly the same as the German *edel* (noble). Thus Edgar the Atheling simply means Edgar the Crown-prince.

ATHELNEY, ISLE OF. This appellation, though it has ceased to be applicable, is retained by a rising ground in the parish of Lyng and hundred of Andersfield, in the county of Somerset. The whole "island" contains about 100 acres, and is at the junction of the rivers Tone and Parret, in the centre of the county.

This spot was anciently surrounded by almost impassable marshes, and has acquired celebrity as the place in which Alfred the Great took temporary shelter while the Danes overran Wessex. It is thus described by William of Malmesbury:—"Athelney is not an island of the sea, but is so inaccessible on account of bogs and the inundations of the lakes that it cannot be got to but in a boat. It has a very large wood of alders, which harbours stags, wild goats, and many beasts of that kind. The firm land, which is only 2 acres in breadth, contains a little monastery and dwellings for monks. Its founder was King Alfred, who, being driven from the district by the Danes, had kept himself for some time in that secure lurking-place." This word Athelney means "royal island" or "island of the nobles."

ATHELSTAN, an illustrious prince in the line of the Saxon sovereigns of England, scarcely less famous than Alfred, his renowned grandfather. He was the first who called himself king of the English, his father and grandfather having been content to call themselves kings of the Anglo-Saxons, while Egbert and the sovereigns between him and Alfred were only styled kings of Wessex.

Athelstan was born six years before the death of Alfred, and, boy as he was, was girded by him with a princely sword. It is a question whether he was, strictly speaking, a legitimate son of his father, Edward the Elder. It is admitted on all hands that his mother was a person of lowly birth, the daughter of a Saxon husbandman.

The eldest son of Edward, and the only son who had arrived at years of maturity except Athelstan, died a few days after his father. This opened the way to Athelstan's succession, who, it is said, was nominated in his father's will. The Witenagemot sanctioned his assumption of the sceptre, and he was crowned at Kingston-upon-Thames, A.D. 925. Athelstan's reign began well. Northumbria submitted first, then the Scotch and Welsh, who had joined hands, were together brought into vassalage and forced to pay tribute, and finally the remaining borderers, the men of West Wales (Cornwall) were incorporated in the realm in like manner. But after ten years the King of Scots revolted, and although he was conquered and his kingdom harried, this was the signal for a grand combined outbreak, in which the chiefs of Cornwall and of Wales, the King of Northumbria, the King of Scotland, and Anlaf the Dane joined. Athelstan marched against these confederated chiefs, and the armies engaged at a place called Brunanburh, in Northumbria. There Athelstan gained a complete victory. His reign was of short duration; he died A.D. 940, in his forty-seventh year. He had no family, and was succeeded by Edmund his brother. Athelstan did not labour more to secure his throne and to extend his power and political influence, which was considerable in Europe, than to give security and legal government to his people.

Alfred had left a code of laws, to which Athelstan made additions, the principle on which he proceeded being to bring all classes, the ecclesiastics and the slave included, within the scope of certain great principles. He encouraged the translation of the Holy Scriptures into the vernacular tongue, and the building of sacred edifices.

ATHE'NA was one of the twelve Olympian gods of ancient Greece. She was fabled to have been born from the brain of her father Zeus, who had swallowed her mother Metis (Intelligence) when Athena was about to be born. Hephestus clove the head of Zeus with a hatchet to free him from the intolerable pain, and Athena sprang forth, fully armed, whilst heaven and earth shook, and darkness covered all things. Athena was therefore "Queen of the Air," as Ruskin has called her in the title of a charming essay—fearful as goddess of storms, wielding her father's lightning and thunder, beneficent as goddess of the blue sky. In her were combined corresponding mental attributes; power almost unlimited, and at the same time the steady clear light of wisdom—as distinct from the flash of genius which Apollo granted as her blue sky from his blazing sunlight. In battle, therefore, Athena is ever victorious, differing remarkably from Ares, god of war. As might be expected, whenever the two come into conflict, as in the Trojan War, Intelligence always defeats mere brute Force. Athena had many surnames. As warrior she was called Pallas-Athena; as protectress of the state, guardian of the statesman's arts, she was called Athena-Polias. Under this last title she had a magnificent temple at Athens, which we describe in GREEK ARCHITECTURE, and of which a representation will be found in the Plates illustrating that article. She it was who taught the use of the plough and rake, the yoking of oxen, the bridle, the rearing of horses, the chariot, the trumpet, the flute, the art of navigation, &c. From Athena the time-honoured work of women with the loom and the needle is derived. Finally, it was she who planted the olive; for when Poseidon and herself were contending for the Acropolis, the gods promised the prize to whichever should create the gift most useful to mortals. Poseidon struck the ground with his trident, and a horse sprang forth; Athena planted the olive. The symbol of agriculture, of fruitful groves, of peaceful arts, was held to be more worthy than that of war, of conquest, and of nomadic wanderings; and the infant city was named *Atheneia*, or, as we call it, *ATHENS*. When the great Persian invasion swept over Attica, and the Athenians fled to their ships while Athens was in flames, Athena besought her father Zeus in vain for her favourite city; it was doomed. Nevertheless, from the blackened stump of the sacred olive, which the invaders had refused to spare, sprang out a fresh green shoot which grew to three yards with wonderful quickness, presaging the rapid recovery and new birth of the city. At the same time the Athenians in their ships helped to win the crushing victory of Salamis.

Athena was always represented as of full age, calm, and very beautiful; draped, generally wearing the Spartan tunic without sleeves, and over it a cloak, a peplos, or (rarely) a chlamys. She almost invariably wears a helmet; and frequently either the *Ægis* or a round Argolic shield with the Gorgon's head in the centre as a boss, is carried, and if so her other hand holds a spear. The owl was sacred to Athena, and she is often represented with a cock or a serpent, typical of her wisdom in medicine. The modifications which her worship obtained in Italy are noticed under *MINERVA*. There were several statues of Pallas-Athena, which, under the name of *PALLADIUM*, were held in high sanctity. The most famous was that of Troy, which preserved the city from capture until Odysseus contrived to steal it. The principal occurrence in the festivity of the Panathenæa at Athens was the carrying to the temple, in procession, the new robe for the Palladium.

ATHENÆUM, the name given in the earliest times to the temples erected to the goddess *ATHENA*, and more especially to her temple at Athens, which was much frequented by poets, philosophers, and orators for the purpose of reading aloud their productions. The name was also taken by the Emperor Hadrian for a college erected by him on the Aventine Hill for the study of poetry, philosophy, law, and rhetoric. This was a kind of university, with a regular staff of professors, and was held in high repute till the fifth century. In modern times the name is freely used by public reading-rooms, literary institutes, &c. It is also the title of an important weekly review of literature and the fine arts, published in London. The *Athenæum* is the name of the principal literary club in London, possessing one of the finest buildings in Pall Mall.

ATHENAGORAS, of Athens, a Christian philosopher, who addressed an "Apology" for the Christians to the Emperor Marcus Aurelius and his son Commodus, demanding toleration for the Christians, and defending them against the then usual accusations of atheism, incest, eating of the flesh of slaughtered children, and the like.

ATHENION, a Sicilian slave, but by birth a Cilician. Athenion was overseer to two wealthy brothers, and during the insurrection of the slaves in Sicily, which is called the Second Servile War (B.C. 102), he gained over the slaves under his own charge. Other slaves flocked to his standard, and he assumed the title and state of a king. He selected for soldiers those who were best suited to bear arms, and made all others labour at their respective callings. When L. Licinius Lucullus, with an army of 17,000 men, was sent by the Roman senate to bring the war to a conclusion, Athenion risked and lost a battle; and Lucullus then laid siege to Triocala, but without success. He was superseded by C. Servilius, who did no better. In B.C. 101 the consul Manlius Aquilius gained a decisive victory, in which Athenion fell. The war was ended by Aquilius, B.C. 99. In this insurrection six Roman armies suffered defeat.

ATHENS (*Ἀθῆναι*, *Athene*), one of the most famous cities of antiquity, and the capital of the modern kingdom of Greece, is situated towards the south of the central plain of Attica, about 5 miles from the sea-coast. During the prolonged war of independence with Turkey (1820–27) Athens was almost entirely depopulated and laid in ruins; but since 1835, when it became the seat of government and capital of the country, the importance and prosperity of the city have rapidly revived; so that modern Athens is a handsome, well built, well-paved town, containing 65,000 inhabitants (or 90,000 including the Piræus). It is the residence of the sovereign, and contains a royal palace richly decorated in the interior, finished in 1843; a university—a handsome modern building, with a fine library; the supreme courts of law, House of Commons, Polytechnic Institution, the Museum, National Bank, Mint, Barracks, Military Hospital, Academy, &c. The Academy is an exceedingly handsome building of Pentelic marble, and in many of its proportions it is modelled after the Parthenon. The tympanum of the principal front has a colossal group of statuary—a reproduction, as far as possible, of the "Birth of Minerva," which adorned the eastern front of the great temple on the Acropolis. From this building one may form some conception of the splendour of the great Athenian temples of sparkling Pentelic marble in the brilliant Athenian sunshine, before time and exposure had dimmed the crystalline purity which this marble shows when newly quarried. The Academy is also of especial interest, because in its decoration those brilliant blues and scarlets have been used in the mouldings, and along the cornice, and on the capitals of the columns, of which so many traces are found in the Parthenon. Some of the best of the public edifices in modern Athens are those which have been erected by the voluntary contributions of opulent Greeks in foreign countries. They comprise the Cathedral, Observatory,

Lycæum, Arsakion or Girls' School, Varvakion or Boys' High School, and two hospitals. Two miles from the city is a fine botanic garden. The old walls have been removed, houses erected, and streets laid out on every side; so that Athens now contains many broad thoroughfares which rival in taste and elegance the best quarters of any European capital. The dwelling-houses seldom exceed two stories; they are covered with plaster, painted white, have balconies in front, and green *persiennes* to the windows, which give them a bright showy look. Two restored aqueducts supply the city with water. One of the greatest drawbacks to modern Athens is the almost entire absence of moisture, so that a blinding, choking dust often rises in dense clouds. The trade of Athens is carried on by means of its port and harbour, the Piræus (or *Peiræus*), which is a rapidly increasing town, containing about 25,000 inhabitants. The two places are connected by a good road, and by a line of railway about 6 miles in length.

ANCIENT ATHENS.—Athens stands on a spot rich in remains of antiquity, and as it was the chosen seat of literature, philosophy, and the fine arts in Greece, the associations connected with it, and the noble ruins in the vicinity, will always combine to make the view from any of the surrounding heights one of the most striking and interesting perhaps in the world.

The ancient city considerably exceeded in extent the modern town, occupying part of the central plain of Attica and some heights which run down into the plain, but are detached from the mountains on the north frontier of the province. A good general idea of the ancient city will be obtained from the Map, *ANTIQUITIES OF ATHENS*, prefixed to this volume. Of the eminences on which Athens was partly built, the most conspicuous are—Mount Lycabettus, with its peaked summit, on the north-east of the city, and beyond the ancient walls; the Acropolis, which was entirely included within the old walls; the Areopagus, opposite the west end of the Acropolis; and the Hill of the Museum, also included within the ancient walls, the highest eminence on the south. On the east side of the city the little river Ilissus, which rises a few miles north-east of Ambelokipos, runs in a south-west direction past the city, separating the heights of Athens on the west from the higher and more continuous range of Hymettus on the east. This little river, which in its natural state might have reached the marshy lands near the coast, is reduced by the heats of summer and the channels for artificial irrigation to an inconsiderable stream.

The most striking object—the Acropolis, or the old Cecropian fortress of Athens—is a rock which rises abruptly from the plain, with its sides naturally scarped, except at the west end; its greatest length is about 1200 feet, and its greatest breadth 550. The great Dionysiac Theatre, the place for dramatic exhibitions, was on the south-east side of the Acropolis; the inner curve was excavated in the rock, and the part which projected into the plain was formed of masonry, the ruins of which still remain. In the recess of this excavation, and above the theatre, Pausanias (i. 21) describes a cavern, which was converted by Thrasylus (B.C. 320), a victorious choragus, into a small temple. A noble-seated figure, of colossal size, now generally called the statue of Bacchus, which was originally placed on the entablature of the small temple, is in the British Museum. On the south-west side of the Acropolis is the site of the Odeum or Musical Theatre of Herodes Atticus, named by him the Theatre of Regilla, in memory of his deceased wife. This splendid monument of the munificence of a private individual was erected in the second century A.D., and was the finest building of the kind in Greece. At the west end of the Acropolis, where alone the approach is practicable, the open space was filled up with the Propylæum, a magnificent work of Pentelic marble, which served both as an approach

and a military defence to the citadel, and the pillars of which still stand. A great part of the eastern side of the Propylæa was destroyed about 1656 by an explosion of gunpowder that took place between the five doors and the west front, which had been formed into a powder magazine. The chief ornament of the Acropolis was the Parthenon (erected about B.C. 450-440), or temple of the virgin goddess Athena, which stood on the highest level of the Acropolis, and was built of the hard white marble of Pentelicus. Much of the building still remains. See PARTHENON.

Of the other ruins on the Acropolis the most interesting is the building which, consisting of various parts, is now commonly known by the general name of the *ERECTEUM*. The bronze colossal statue of Minerva the Defender, the work of Phidias, stood on the Acropolis. The spear and helmet of this colossal figure (Pausan. i. 28) were visible towering above the Acropolis to those who approached Athens by sea, as soon as they had rounded Cape Sunium. Opposite to the west end of the Acropolis, and separated from it by a depression, is the Areopagus or Hill of Mars, on the eastern and higher extremity of which was the court of the *AREOPAGUS*. Adjacent to the Areopagus on the west was the Pnyx, where the public meetings were held in the more ancient period of the state, and where a *bēma*, or pulpit of stone, still marks the place from which the assembly was addressed.

North of the Areopagus is the Temple of Theseus, built of Pentelic marble, the best preserved building of ancient Athens. Nearly due east of the Temple of Theseus are the remains of what is probably the Stoa or Portico of Hadrian, one of the monuments with which he embellished the city of Athens. South of the Stoa is the Temple of the Winds, called also the Tower of Andronicus Cyrrhestes.

The south-east quarter of the city is entered by the Arch of Hadrian. This building, of Pentelic marble, consists of a circular arch with Corinthian columns, the entablature of which supports another ordinance of Corinthian columns, surmounted by an entablature, with a pediment in the centre. An inscription upon the frieze on the south-east side of the arch shows that the emperor gave his name to the part of the city between this edifice and the Ilissus. Here stood the magnificent Temple of Olympian Zeus (Jupiter Olympus), which, being recommenced about B.C. 175-165, on the site of an older temple, and worked upon at intervals, was finished by the liberality of Hadrian. Sixteen columns of Pentelic marble, 60 feet high, and above 6½ in diameter, are all that now remain of the 128 which once adorned this magnificent building. The fountain called Callirhoe or Enneacrunus (the "nine springs"), the only source of fresh water in the neighbourhood, was but a short distance from the south-east angle of the great temple. An aqueduct from Cephissia, on the Cephissus, was constructed for the use of the city by Hadrian and Antoninus Pius his successor.

Beyond the quarter called Hadrian's City, on the east side of the Ilissus, is the Panathænic Stadium, first constructed by Lycurgus the orator, B.C. 350, and adorned with Pentelic marble by Herodes Atticus, in the reign of Hadrian. Part of the masonry at the south-east or circular end, and the *Carrea*, or part used for the exhibition of the Panathænic games, remain. Its length in the interior is 675 feet.

The small choragic monument of Lysicrates, erected about B.C. 334, vulgarly called the Lantern of Demosthenes, stands between the south-east angle of the Acropolis and the great Temple of Zeus (Jupiter).

The three ports of Athens, going from west to east, were the Piræus, which contained three natural bays; the Munychia, now Stratiotiki, separated from the Piræus by the peninsula of Munychia; and Phalerum, now Port Phanari. These three ports, with the buildings attached to them, once formed a separate city larger than Athens. A sea wall, 60 Greek feet high, and constructed of wrought

stone, extended from the Bay of Phalerum all round the rocky peninsula of Munychia, terminating about Cape Aleimus; the north-west and west side of the Piræus was also inclosed by a wall running down to the sea; a wall ran from the Phaleric Port across the high ground to the head of the middle bay of the Piræus; and a third wall ran across the narrow isthmus of the Munychia. The importance and strength of the fortifications of the maritime city, and especially of the Munychia, appear from the siege of this place by Demetrius Poliorcetes, and by Sulla.

Athens was connected with its ports by the Long Walls (*Gir. makratheke*), which abutted on the city, respectively at the Hill of the Museum and the Gate of Piræus. The direction of the Long Walls from the Piræus is E. by N. by compass, as appears from their existing foundations. The southern wall, which ran from the city to the Phalerum, was called the Phaleric Wall; the northern, which ran from the Piræic Gate to the Piræus, and was a double wall, was sometimes called the Long Walls and sometimes the Piræic Wall. The total circumference of the city walls was about 22 miles. They were strengthened with towers. There were also square towers on the Long Walls which connected the city with the ports. The cemeteries surrounded the city, but were most conspicuous on the north and north-west, where they commenced immediately on the outside of the walls. The road from the Gate Dipylum to the Academy was lined with the tombs of illustrious men, such as Pericles, Thrasybulus, Chabrias, and Phormion. Here too were the monuments of those who fell in their country's service; a slab of stone, with the name and township (*δῆμος*) of each individual, was the honour paid by the state to its citizens who died in battle (Pausanias, i. 29). The Academy was surrounded with a wall, planted with trees, and ornamented with fountains of water. Near it was the tomb of Plato.

Boeckh estimated the population of ancient Athens and its ports to have been 180,000; Clinton, 160,000; and Leake, 116,000. The commercial operations of the city embraced every known country and commodity. "All the products of foreign countries," says Boeckh, "came to Athens, and articles which in other places could hardly be obtained singly were collected together at the Piræus. Besides the corn, the costly wines, iron, brass, and other objects of commerce which came from all the regions of the Mediterranean, they imported from the coasts of the Black Sea slaves, timber for shipbuilding, salt-fish, honey, wax, tar, wool, rigging, leather, and goat skins; from Byzantium, Thrace, and Macedonia, timber, slaves, and salt-fish; slaves from Thessaly; carpets and fine wool from Phrygia and Miletus." "All the finest products," says Xenophon (*"De Rep. Ath."* ii. 7), "of Sicily, of Italy, Cyprus, Lydia, Pontus, and the Peloponnesus, Athens by her empire of the sea is able to collect into one spot." Nor were manufactures neglected. It is true that commerce was regarded as the chief point of national policy, and that every encouragement was given to it which high protecting regulations and other privileges could bestow. But no restriction was imposed upon trade; hence every branch of industry flourished, and the manufactures of Athens were everywhere esteemed. The native products of Athens, too, were of great importance. They consisted chiefly of olives, figs, and honey, and have been celebrated in all ages. The wealth of the city was also augmented by the silver mines of Laurion; and those sumptuous edifices which constituted the pride of the Athenians, and are the admiration of the present day, owed their origin to the marble quarries of Pentelicus. The opulence, prosperity, and power of Athens are fully exhibited by Thecydides (lib. ii. 13). The same historian has distinctly indicated (lib. ii. 40) that the freedom of the Athenian institutions, so pre-eminently adapted to develop the energies of the human mind, was the chief source of their unparalleled greatness.

Athens was undoubtedly inferior to Rome in the pavement of its streets, in its sewers, its supply of water, &c. But the magnificence of the public buildings compensated for such inferiority and for the poverty and meanness of the domestic architecture. The soil and climate undoubtedly exercised a very important influence upon the buildings of the city, and on the manners of its inhabitants. The Athenians worshipped, legislated, and witnessed dramatic representations under the open sky. The clearness and brilliant colourings of the atmosphere, the flood of fire with which the marble columns, the mountains, and the sea are bathed by an Athenian sunset, the violet hue which *Hymettus* assumes in the evening sky, in contrast to the glowing rock of *Lycaebettus* and the rosy *Pentelicus*, have been felt and admired by ancient and modern poets. Euripides describes his countrymen as "ever lightly tripping through an ether of surprising brightness" (*Medea*, 825).

In recent years excavations of the ancient sites and buildings of Athens have been systematically carried on with the most interesting results. The work has been chiefly undertaken by the Archaeological Society of Athens; but the antiquaries and scholars of all Europe have seconded their labours, and France and Germany have vied with Great Britain in the prosecution of the work of Athenian discovery.

History.—Concerning the early inhabitants of Athens, we are almost wholly destitute of information; and even after its history begins to emerge from obscurity, the events which distinguish it are for a long time scanty and doubtful. The myth runs that *Cecrops* (B.C. 1556), a native of Egypt, by marrying the daughter of *Actæon*, obtained the sovereignty. He collected the hitherto scattered inhabitants of Attica, divided them into tribes, and founded the *Aropolis*. Later, the aristocratical was substituted for the monarchical form of government, and the title of "king" was exchanged for that of "*Arcton*." A strong desire for a definite code of laws arising, *Draco* was chosen as the lawgiver (B.C. 624). The severity of his code, however, which awarded the punishment of death at once to the most venial offences and the most flagrant crimes, soon rendered it incapable of execution; and *Draco* lost the public favour and died in exile. To quell the disturbances which continued to distract the city, the people (B.C. 594) had recourse to *Solon*, who had already distinguished himself as a general, and invested him with the office of archon. The code of laws which he framed was admirably suited to the exigency of the times; for though its tendency was decidedly democratic, a counterbalancing check was given to popular encroachment by the establishment of the Assembly of 400, and by the prerogatives vested in the court of *Areopagus*. Indeed, the freedom of spirit which *Solon* introduced and rendered durable, and the liberal education which the whole system of his laws made indispensably necessary to the noble and wealthy citizens, soon rendered Athens the leader of all the republics of Greece. Indeed, from *Solon*, as from our King Alfred, all the guiding principles of the state were believed, by a grateful and credulous posterity, to have originated. Nor were the consequences of *Solon's* measures at all retarded by the subsequent domination of *Pisistratus* (B.C. 561). For notwithstanding his assumption of the regal power, his administration was characterized by an assiduous cultivation of the arts and sciences; and it is to him that posterity attributed the collection of the Homeric poems in their present definite form. That the spirit of Athenian freedom was not extinct, was proved by the expulsion (B.C. 510) of *Hippias* and *Hipparchus* (the sons of *Pisistratus*), whose tyranny became oppressive; and from this time the constitution of *Solon* was gradually melted down into a pure democracy, until *Cleisthenes* gave the last blow to the aristocracy by the institution of ostracism.

The petty internal contests which had agitated Athens

were now, however, to be swallowed up in others of far greater magnitude. With rapid strides the Persian monarchy had been encroaching upon Greece, and most of the Grecian states had already sworn fealty to *Darius*, when Athens and *Lacedæmon* raised the banner of defiance, and the battle of *Marathon* (B.C. 490), under the conduct of *Miltiades*, at once achieved the liberty of Greece, and covered Athens with glory. Then followed, ten years later, the invasion of Greece by *Xerxes*, his alternate successes and defeats, the seizure and conflagration of Athens and its citadel, the stratagems of *Themistocles*, the memorable battles of *Salamis*, *Platæa*, and *Mycale*, ending in the utter defeat of the Persians. Athens received from the Persian invasion a great impetus in its naval affairs. *Themistocles*, who was eminently imbued with a naval spirit, caused (B.C. 479) a new and more commodious harbour to be built at the *Piræus*, which in process of time was joined to the city by the celebrated Long Walls. This precaution invested Athens with the command of the sea, and raised her commercial and military marine to an unexampled pitch of prosperity; a prosperity which was maintained in full vigour by the moderation of *Aristides*, so deservedly named the Just, and by the generous and martial spirit of *Cimon*, son of *Miltiades* (B.C. 466). Before the Persian invasion, Athens had contributed less than many other cities, her inferiors in magnitude and in political importance, to the intellectual progress of Greece. She had produced no artists to be compared with those of *Argos*, *Corinth*, *Sicyon*, *Ægina*, *Læconia*, and of many cities both in the eastern and western colonies. She could boast of no poets so celebrated as those of the Ionian and *Æolian* schools. Her spirit hitherto had been decidedly martial; but her peaceful glories quickly followed, and outshone those of her victories and political ascendancy. After the termination of the Persian war, literature and the fine arts began to tend towards Athens as their most favoured seat; for here, during the age of *Pericles*, above all other parts of Greece, genius and talent had an ample field of exertion, and were fostered by public sympathy and applause. It was during this age that painting, architecture, and sculpture reached the highest degree of perfection; and that Greek poetry was enriched with a new kind of composition, the drama, which exhibited all the grace and vigour of the Athenian imagination, together with the full compass and the highest refinement of the language peculiar to Attica. The drama was indeed the branch of literature which peculiarly signalized the age of *Pericles*; and the intellectual character of the Athenians is vividly portrayed by the sublime and impassioned strokes of *Æschylus*, the profound religiousness of *Sophocles*, the sophistical moralizings of *Euripides*, and the caustic railery and satirical power of *Aristophanes*. And though time has effaced all traces of the pencil of *Parrhasius*, *Zenxis*, and *Apelles*, posterity has assigned them a place in the temple of fame beside *Phidias* and *Praxiteles*, whose works are even at the present day remarkable for classical purity of design and perfection of execution. But the advantages that flowed to Athens from the administration of *Pericles* were not without alloy. The splendor which he introduced exhausted the public revenues; and to supply deficiencies, recourse was had to the infliction of rigorous imposts upon the allied states. Hence a spirit of disaffection was engendered; and *Sparta*, which had long viewed the magnificence of her rival with jealousy, seized the opportunity of fanning the discord into a flame. This issued in the *Peloponnesian War*, the various fortunes of which have been so graphically recorded by the pen of *Thucydides*. After the lapse of twenty-seven years, during which period the fortunes of the conflicting parties underwent various vicissitudes, victory at length declared for the Spartans, and the Athenians were forced to submit to the domination of the Thirty Tyrants, a humiliating period in the history of Athens. It was reserved, however, for the

skill of Thrasybulus (B.C. 403) to restore to Athens its former constitution—a revolution which he was able to effect without much severity or effusion of blood. Perhaps in the whole history of the Athenians there is no feature more remarkable than the vigorous elasticity of spirit which they displayed in recovering from disasters; and never was the truth of this remark so strikingly illustrated as at this period. One generation had scarcely passed away since she was groaning beneath the Thirty Tyrants and the Reign of Terror—her native energies prostrate, her external resources swept away—and now we find her on a lofty eminence. Seventy-five cities hail her as the head of their confederacy; the *Ægean* Isles are numbered among her foreign settlements; Lacedæmon recognizes her dominion of the sea; she is confessedly, and without a rival, once more the first of the Grecian communities. Not is this all; hitherto we have seen her producing and fostering legislators, warriors, statesmen, painters, sculptors, poets, historians, and orators; we are now to behold her in another aspect, as the mother of that philosophy, at once subtle and sublime, which even at the present hour exerts a powerful influence over the human mind.

From this time a new era begins in the history of Athens. Philip, king of Macedonia, by dint of dissimulation and bribery, contrived first to embroil the different states of Greece, and then to trample on their independence. The Athenians, roused by the eloquence of Demosthenes, made a vigorous defence (B.C. 338); but the battle of Chæronea proved adverse to their hopes, and on this field sank the supremacy of Athens. She made various abortive efforts to throw off the yoke of Alexander the Great, and the different generals who succeeded him in the government. In this state she continued, the sport of every tyrant who chanced to draw a prize in the lottery of war, till Sulla proclaimed Athens a tributary of Rome (B.C. 86). But while Athens thus saw every trace of her political existence vanish, she rose to an empire scarcely less flattering, to which Rome itself was obliged to bow. Her conquerors looked to her as the teacher and arbiter of taste, philosophy, and science; and all Romans ambitious of literary attainments flocked to Athens in order to acquire them. This tribute of respect to Athenian taste and genius was paid by various Roman emperors in succession. Under Hadrian (A.D. 117) she even regained much of her former internal splendour; and his example was followed by several of his successors, though on a less magnificent scale. The description of Athens by Pausanias belongs to this period. In the third century, according to Zosimus, Athens was taken by Gothic invaders, who, however, did not long retain their acquisition, having been expelled by the inhabitants under the command of Cleodemon. In the year 398 it was again taken by Alaric, king of the Goths, who is said to have laid in ruins its stately structures, and to have stripped it of its ancient splendour. After this dreadful visitation Athens sank into insignificance, and became as obscure as she had once been illustrious. We are told, indeed, that the walls of Athens were put in a state of defence by Justinian; but from the time of this emperor a chain of nearly seven centuries ensued in its history, except that in the year 1130 it furnished Roger, king of Sicily, with a number of artificers, who there introduced the culture of silk. Doomed apparently to become the prey of every spoiler, Athens emerges from oblivion in the thirteenth century only to show us Baldwin and his crusaders besieged within its walls by a general of Theodorus Lascaris, the Greek emperor. In 1427 it was taken by Sultan Murad, but some time afterwards was recovered from the Turks by another body of crusaders under the Marquis of Montferrat. The next rulers of Athens were the Acciaïoli, an opulent family of Florence, in whose possession it remained till 1455, when it was taken by Omar, a general of Mohammed II., who

settled a colony in it, and incorporated it completely with the Turkish empire. In 1687 it was captured by the Venetians under Morosini, after a short siege, during which the Parthenon, then in an almost perfect state, and the other buildings of the Acropolis, sustained great damage. After a short interval it again fell into the hands of the Turks, under whose jurisdiction it remained until the treaty of Adrianople in 1829, following up the provisions and the stipulations of the treaty of London in 1827, established the kingdom of Greece, of which Athens is the capital.

ATHERINE (Atherinidae) is a family of fishes nearly allied to the *MULLER*; but whereas in the latter there are only twenty-four vertebrae in the spine, in the Atherines they are very numerous. They are small fish of slender form, with scales of a moderate size. The teeth are small, and in many species are wanting. The eyes are lateral, the gill-openings wide. They are carnivorous, inhabiting temperate and tropical seas.

The genus *Atherina* abound in the Mediterranean, and two species, *Atherina presbyter* and *Atherina boyeri*, are found on the southern British coasts. They are somewhat like the smelt, and often go by that name, but may be distinguished by their small first spinous dorsal fin. They are hardly ever more than 6 inches long, but are conspicuous from congregating in vast shoals along the shore. They are a delicate fish, much esteemed for food. These fish belong to the *ACANTHOPTERYGII*.

ATHEROMA, a degeneration of tissue very liable to occur in old age as a natural result of senile decay, and earlier in the case of those who have led dissipated lives. It principally affects the inner coats of the arteries, which become roughened and brittle, and covered by opaque yellowish-white patches, which show, when examined under the microscope, granules of fat and crystals of cholesteroline. It has the effect of diminishing the elasticity of the arterial tube, and generally precedes aneurism.

ATH'ERSTONE, a market-town in the county of Warwick, with a station on the London and North-western Railway, 7 miles S.E. of Tamworth, and 102 from London, is situated in a valley surrounded by finely wooded hills, on the Roman road called Wadling Street. It contains several well-built churches and chapels, a new grammar-school, market-house, &c. Some manufactures of hats are carried on. Here the Earl of Richmond (Henry VII.) conferred with the disaffected nobles of Richard III. on the eve of the battle of Bosworth Field, which lies about 5 miles distant, in the county of Leicester. One mile S. is Mancetter, the site of the *Manducaecium* of the Romans, where important remains of the ancient camp may still be seen. Population, 4000.

ATH'ERTON, a town in the county of Lancashire, with a station on a branch line of the London and North-western Railway, 4 miles S.S.W. from Bolton, and 196 from London. The population in 1881 was 12,602, an increase of 5000 from 1871. They are chiefly employed in collieries, cotton factories, and ironworks.

ATHLONE (*Ath-Luin*, "the ford of the Luan"), a former parliamentary borough in Ireland, on the Shannon, partly in the county of Westmeath and partly in that of Roscommon, 76 miles W. from Dublin by the Midland Great Western Railway. Athlone is the ordnance depot for the west of Ireland, and is strongly fortified on the Roscommon side, has barracks for 1600 men, and contains 15,000 stand of arms. The old bridge having been too narrow to allow carriages to pass each other, a new one was constructed in 1844. The navigation of the Shannon is interrupted at Athlone by rapids, but a canal a mile long removes the difficulty, and the Shannon is thus rendered navigable 71 miles higher up. The town is inconveniently and irregularly built, but the houses are of stone, and strong. It contains two churches, four Roman Catholic

chapels, a chapel belonging to the Franciscan Friary, and another belonging to the Augustinian Friary, a Presbyterian meeting-house, two Methodist meeting-houses, a sessions court-house, and a bridewell. The castle, erected in the reign of King John, and extended and strengthened in that of Elizabeth, forms a part of the military defences, which command the approaches to the town in all directions. The town contains breweries, distilleries, saw mills, and a woollen factory, and a brisk trade is carried on with Limerick by steamers, and with Dublin by the Grand and Royal Canals. The population in 1881 was 6901. The borough returned a member to Parliament until 1885, when it was merged in the county.

ATHOL, a district in the northern part of Perthshire, formerly one of the hereditary jurisdictions into which many parts of Scotland were divided. It is bounded on the N. by Badenoch in Inverness-shire; on the N.W. and W. by Lochaber, also in that county; on the S. by Breadalbane and Strathmore in Perthshire; on the E. by Forfarshire; and on the N.E. by Mar in Aberdeenshire. The district is very mountainous, and contains a part of the great Grampian chain; some of the mountains are of considerable height—Cairn Gowr, 3690 feet, and Scarsoch, between Athol and Badenoch, 3390. The mountains are intersected by narrow glens, watered by rapid rivulets. These, by their junction, form the rivers Edendun, Bruar, and Tilt, which fall in the order in which their names occur into the river Garry. This becomes a tributary of the Tummel, which flows along the south part of the district into the Tay. Athol was once the best hunting district in Scotland, and its forest still contains several thousand deer. The district gives the title of duke to the ancient house of Murray.

ATHOS, a mountain at the extremity of the long peninsula which projects from Chalcidice, and separates the Gulfs of Contessa and Monte Santo, on the coast of Macedonia. The name Athos was given to the whole mountainous peninsula, which is joined to the mainland by the low isthmus near the site of Acanthus (Herod. vii. 22). The Franks now call it Monte Santo, and the Greeks call it *Agios-oros*, both implying "holy mountain." This appellation it has obtained from the numerous monasteries, convents, chapels, and other sacred spots scattered round its sides. The number of monks in these establishments is supposed to exceed 8000, exclusive of lay brethren, artificers, and labourers. Agia Laura contains upwards of 600.

According to their oath, the monks devote themselves to meditation, celibacy, retirement, and poverty. Though individually poor the fraternities are by no means so; but it is their interest to conceal their riches, in order to avert the grasping avarice of the Porte. Their wealth is chiefly derived from the oblations of pilgrims, and from the trade which is carried on with Salonica and Smyrna. This trade consists almost exclusively of fruits. The gardens of the monasteries produce both fruits and vegetables of all kinds, and are kept in the highest order, as well as the farms, called *metochi*, attached to the several monasteries. Although the monks are ignorant the monasteries contain libraries, among which there are said to be valuable manuscripts.

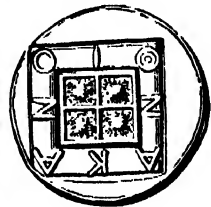
The Russians, Bulgarians, and Servians have each their respective monasteries; and caravans of from 200 to 500 pilgrims arrive periodically from those countries. The treaty of Berlin, of 1878, contained a clause which secured several valued privileges to the monks of Mount Athos.

On the sides of the mountains are vast forests of pines, oaks, and chestnuts. The appearance of the mountain is very magnificent, standing in lonely majesty at the termination of ridges of considerable elevation, and rising abruptly from the sea to a height of 6349 feet. The shores at its base are so steep that there is no anchorage for vessels;

within a quarter of a mile of the coast there are from 80 to 100 fathoms water. The dangers of the shores of Athos were experienced by the Persian fleet under Mardonius, B.C. 492 (Herod. vi. 44), which was completely destroyed by a storm on this coast; wherefore Xerxes, in his invasion ten years later, cut a canal through the isthmus.

The peak of Athos is in $40^{\circ} 9\frac{1}{2}'$ N. lat., $24^{\circ} 20'$ E. lon. The canal of Xerxes can still be traced across the isthmus from the Gulf of Monte Santo to the Bay of Erso in the Gulf of Contessa, with the exception of about 200 yards in the middle, where the ground has no appearance of having been touched. But as the whole canal was excavated by Xerxes, B.C. 481 (Herod. vii. 37, 122, and Thucyd. iv. 109), it is probable that the central part was afterwards filled up to allow a more ready passage into and out of the peninsula. The distance across is 2500 yards, which agrees very well with the breadth of 12 stadia assigned by Herodotus. The width of the canal appears to have been about 18 or 20 feet; the level of the earth nowhere exceeds 15 feet above the sea; the soil is a light clay.

About $1\frac{1}{2}$ mile to the westward of the north end of the canal is the village of Erso, which gives name to the bay, situated on an eminence overhanging the beach; this is crowned by a remarkable mound forming a small natural citadel. On the side facing the sea there is part of an



ancient Hellenic wall, about 150 yards in length, and from 20 to 25 feet in height, which is probably the site of Acanthus. The great mound may be that mentioned in Herodotus (vii. 117), who says that the Persian Artachates, the superintendent of the canal, died while Xerxes was at Acanthus, and "the whole army raised a mound for him." Herodotus also says (vii. 125) that the army of Xerxes, on its march from Acanthus to Therme, was annoyed by lions, which seized the camels carrying provisions. The lion killing a bull appears on the reverse of the coin of Acanthus.

ATHY, a town in the county of Kildare in Ireland, about 33 miles S.W. of Dublin. It is on both banks of the river Barrow, which is navigable for barges from Athy downwards to Ross and Waterford. It also communicates with Dublin by a branch from the Grand Canal and by the Great Southern and Western Railway. The court-house is a small building. There are a church, a Roman Catholic chapel, a Methodist chapel, and schools. The chief trade is in corn. The population in 1881 was 4181—a decrease of 329 from 1871.

ATHYRIUM is a genus of FERNS allied to ASPLENIUM. Both agree in having elongated sori springing from the sides of the veins, and the coverings for the sori being scale like; but in Athyrium these coverings (indusia) are curved. *Athyrium Filix-femina* is the graceful lady-fern, mentioned by Sir Walter Scott in "Waverley"—

"Where the copsewood is the greenest,
Where the fountain glistens sheenest,
Where the morning dew lies longest,
There the lady-fern grows strongest."

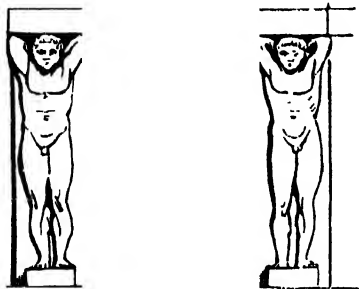
This, one of the loveliest of our native ferns, is found widely distributed over the British Isles.

ATLAN'TA, a town in Georgia, South America, on the junction of the Tennessee and Virginia railways. During the American civil war the town became an extensive government depot and manufacturing centre for the Con-

federates. After a long struggle it was taken by the Federal general Sherman in 1864, but subsequently evacuated.

ATLANTA is a molluscous animal belonging to *HYPEROPODA*, an order of *GASTEROPODA*. It has a small, glassy, transparent shell. The head is large and muzzle-shaped, and the tentacles are conical, with conspicuous eyes behind them. The Atlanta swims at the surface of the sea by means of its fin-like tail, to which the operculum is attached. There are eighteen species found on the shores of the Canary Islands and in the warmer parts of the Atlantic Ocean.

ATLAN'TES is a term applied to figures or half figures of men used in the place of columns or pilasters, to sustain an entablature; they are called also *Teknonnes*, both words coming from *τεκνω*, to bear. In the temple of Zeus Olympius at Agriguntum, restored by Mr. Cockerell, and described in Stuart's "Athens" (vol. 4), Atlantes are represented standing upon a plinth placed on the entablature above the pilasters of the cella of the temple, and supporting with their heads



and arms the entablature on which the beams of the roof were to have been placed. The Atlantes of this temple were 25 feet high, built in courses of stone, corresponding with the walls of the cella, and partly attached to it. The annexed woodcut shows the front elevation of the figures. Similar female figures are called *CARYATIDES*.

ATLAN'TIC OCEAN is the name given to that part of the ocean which separates the old world from N. and S. America, washing the eastern shores of the Americas and the western shores of Europe and Africa. Its name is derived from the Greek mythology; not from the mythical island *ATLANTIS*, but from the position of the Titan *ATLAS*, who bore the weight of heaven on his shoulders, standing upon its African shores. The true Greek name was *Oceanus*; Atlantic was only a title given to it on the above account. The two continents which form its shores approach nearest each other between 69° and 71° N. lat., where the coasts of Greenland are only 800 geographical miles from those of Norway. Its greatest breadth is under 30° N. lat., where the peninsula of Florida and the western coast of Morocco in Africa are separated by upwards of 3600 geographical miles.

A remarkable and important feature of the North Atlantic is its connection with mediterranean or interior seas of great extent. Such are the Baltic, the Mediterranean, Hudson's Bay, the Gulf of Mexico, and the Caribbean Sea. These seas doubtless form part of the Atlantic Ocean; but they cannot be considered as bays or gulfs, the connection between them and the Atlantic being effected by narrow straits, and not by an open sea; and, besides, they extend so far into the continents that one of them, the Mediterranean Sea, affords by itself a navigation of 3000 geographical miles. This peculiarity in its form brings the Atlantic Ocean and its appendages into immediate contact with a much greater extent of country than

the other seas that wash both continents. We accordingly find that the continental shores of the Atlantic exceed in extent those of the Pacific Ocean and the Indian Sea, the two other great divisions of the ocean, taken together, though the latter cover at least three times the surface of the former. The Atlantic and its seas together wash nearly 50,000 miles of coast.

No first-class river, except perhaps the Congo, flows into the Atlantic from Europe or Africa, the Rhine, the Danube, the Dnieper, and the Nile being of the second class. But, on the American side, the Atlantic rivers are on the grandest scale, including the Amazon, the Plata, the Orinoco, the Mississippi, and the St. Lawrence. It is calculated that the areas of country drained by rivers which flow into the Atlantic and its seas are 6,000,000 square miles in America, 6,000,000 in Africa, 3,000,000 in Europe, and 500,000 in Asia.

If we except the chain of islands which separates the Gulf of Mexico and the Caribbean Sea from the Atlantic, and which are therefore to be considered as forming part of its shores, the Atlantic can hardly be said to contain any large group of islands between 50° N. lat. and 50° S. lat. The Azores, Canaries, and Cape de Verde Islands, as well as those of Guinea and the Bermudas, are small, and present few difficulties to navigators.

With respect to the *winds*, the whole surface of the Atlantic Ocean may be divided into three regions, in one of which the winds maintain a constant course from east to west, and have obtained the name of *trade winds*. This region extends to about 30° of lat. on both sides of the equator. The other two regions, to the north and south of the thirtieth parallel in both hemispheres, are subject to a continual change, and are therefore called the regions of variable winds.

The trade-winds extend on the American coast to an average latitude of about 30°, while on the African coast the average is about 28°. Their direction changes with their progress from east to west. Near the old continent, and north of the equator, the direction is from north-east, or nearly so, but further off it declines more to the east, so that in the middle of the ocean it is east a quarter north, and on the coasts of America it blows from due east. The trade-winds are rather a breeze than a wind, and their blowing is uniform, constant, and not interrupted by squalls. The waves raised by them are low, and their swell is gentle. They do not begin to blow on the coast of the continents, but only at a considerable distance from them. Thus between Africa and the Canaries and Cape de Verde Islands there is a west wind, owing to the heat of the continent near the Sahara Desert; while in the region of calms the winds near the shore have the periodical character of the monsoons. On the American side the trade-winds north of the equator do not undergo any change along the coast; but along the coast of Brazil they partake of the character of monsoons.

These are the winds which blow on both sides of the equator to 30° lat. To the north and south of this region the winds are variable; but westerly winds prevail in both hemispheres. Besides being variable in direction, they vary extremely in the degree of force with which they blow.

Two large stream-currents traverse the Atlantic Ocean—the *Equatorial Current*, running from the coast of Africa to that of South America; and the *Gulf Stream*, flowing from North America to the shores of Europe.

The Equatorial Current is formed in the Bay of Benin. Hence it proceeds to the west on both sides of the equator, as far as 22° W. lon., where it sends off a branch to the north-west. Soon afterwards it declines somewhat to the south, and runs in this direction towards the two capes of St. Augustin and St. Roque, on the Brazilian coast. At the distance of about 300 sea miles from these capes it divides into two currents; the northern, running along the

shores of Guiana, and hence deriving the name of Guiana Current, enters the Caribbean Sea by the straits which separate the Leeward Islands, lying to the south of Martinique, from each other and from the continent of South America; and in some measure in this sea it may be supposed to terminate its course. The Brazil Current, or the other branch of the equatorial current, runs to the south-west along the shores of Brazil to the mouth of the River Plate, and may even be traced to the Straits of Magellan. The breadth of the current is different in different parts, varying from 160 to 450 miles. The velocity also varies, both as to places and seasons; it is greater in summer than in winter, and sometimes reaches 80 miles a day. The temperature of the water is less than that of the ocean generally, varying from 73° to 76° Fahr.

The most remarkable and at the same time the best known of the Atlantic currents is the Gulf Stream, which traverses the sea between 36° and 44° N. lat. Its origin is in the Gulf of Mexico, where the warm water which enters it from the Caribbean Sea, between Cape Catoche and Cape St. Antonio, is raised to a high temperature, the thermometer indicating 86°, while under the same parallel (25° N. lat.) the ocean only shows 78°. Two currents, which put in motion perhaps three-fourths of the waters of the Gulf of Mexico, unite about 60 nautical miles to the westward of Havana, between the bank of Isabella on the side of Cuba and the Tortugas on that of Florida Reefs; and this union gives rise to the Gulf Stream. The stream passes along the shores of Cuba; through the Straits of Florida; along the shores of Georgia and Carolina; bends round gradually to the north-east, almost touching the bank of Newfoundland; and, after assuming an eastern and a south-eastern direction, passes near the Azores. The current itself does not much exceed 100 miles in breadth; but the warmth of the water in some places extends 300 miles. At the commencement its velocity is very small; but in some places it reaches the amount of 120 miles per day, or 5 miles per hour. The temperature throughout its whole course is from 8° to 12° Fahr. above that of the ocean in corresponding latitudes.

The whole course of the Gulf Stream amounts to upwards of 3000 nautical miles, and the water traverses this distance in about eleven weeks. The stream forms a vast expanse of warm water in the centre of the North Atlantic; and it is ascertained that the region of the Gulf Stream, more than any other part of the ocean, is subject to very violent storms. It was long generally supposed that the mild climate by which the countries along the coast of the Atlantic Ocean are so favourably distinguished from those further inland was mainly due to the vicinity of this warm current. Dr. Carpenter, however, maintains that European climatic conditions are much less dependent on the Gulf Stream than was formerly supposed; but are chiefly affected by the flow of equatorial water towards the pole, which, in his opinion, is ever taking place, and which will be more particularly described in the article OCEAN.

Besides the Gulf Stream two other currents in the North Atlantic deserve notice—the Arctic Current and the North African or Guinea Current. The Arctic Current, which originates in the extensive masses of ice which surround the North Pole, runs down along the eastern shores of Greenland, whence it carries numerous ice-fields to the south-westward. These masses along the coast of Greenland are found extending from 250 to 300 miles from the shore into the open sea, and mark, as it were, the breadth of the current, which fills with them the strait that divides Iceland from Greenland, and carries them to Cape Farewell, the most southern extremity of Greenland. The current then passes along the Labrador coast, and joins the Gulf Stream near Newfoundland. Its velocity is from 8 to 16 miles a day, and its temperature is 12° or 16° Fahr. below that of the ocean generally.

The North African or Guinea Current has its origin in the sea between the southern coast of Ireland and Cape Finisterre in Spain; and from thence to the coast of Africa the water has a direction of movement varying from S. to S.E. and sometimes almost due E. At the Cape Verde Islands it turns slowly round towards the S., and afterwards towards the S.E. and E.S.E., influenced by the form of the coast of Africa. Between Cape Verde and Cape Mesurado the distance of the current from the shore is about 200 nautical miles, and this space is occupied by periodical currents. Having passed Cape Mesurado the current sets due E., and becomes finally dissipated in the Gulf of Guinea. One branch of the Guinea Current, which separates from it near its origin, sweeps completely round the portion of sea between Spain, France, and England, and often renders the Bay of Biscay very dangerous.

The temperature of the Atlantic is much influenced by the masses of ice which float from the Polar regions towards the equator. These masses, split up by the short summer heat, travel in smaller portions (in the northern hemisphere) as far south as Newfoundland; and when the next winter's cold freezes them together they form a sort of icy ridge or reef, extending in a waving but almost unbroken line from Newfoundland, past Greenland and Iceland, to Spitzbergen and Nova Zembla. There are very few previous passages through this icy reef until the month of June; but when the passage is made, open sea is met with beyond; and the whale fishers and seal fishers call the season an "open" or a "close" one, according to the ease with which they can break across this barrier. The ice met with in the sea between Greenland and Spitzbergen consists commonly of ice-fields or pieces of a single sheet, with its surface raised in general 4 or 6 feet above the level of the sea, and its base depressed to the depth of from 10 to 20 feet beneath. But the deficiency in elevation is sufficiently compensated by the amazing extent in surface, some of these ice-fields being many leagues in length, and covering an area of several hundred square miles. Ice-islands or ice-bergs are also found, but they are neither so numerous nor so bulky as those of Baffin's Bay, where they attain an immense size. In the southern hemisphere the ice does not advance to such low latitudes in any part of the sea.

The bed of the Atlantic is much better known than that of any other part of the universal ocean. The space between Europe and North America has been most carefully examined by expeditions of the commercial nations, in order to establish telegraphic communication from shore to shore; and a very large number of soundings were taken, during the cruise of the *Challenger*, in both the North and South Atlantic. The general configuration of the bottom of the Atlantic may be thus described:—An elevated table-land, averaging 1900 fathoms from the surface of the water, extends the whole length of the ocean from north to south, half-way between the European and African coasts on one side, and the American on the other. On the north it joins a transverse plain, stretching from Ireland to Newfoundland, on which the first Atlantic cable was laid. Towards the south-east it approaches the Cape of Good Hope, and on the west nearly touches the north-west coast of South America, a short way north of the equator. Thus three deeper basins are left, one long and narrow, starting from the west coast of Europe along the whole west side of Africa. There is another near the American coast, from about 35° to 12° N. lat., which is the deepest; and a third to the south-west, extending from near the equator to about 30° S. lat., and probably open to the great Antarctic Ocean. The whole Atlantic may be looked on as a huge gulf of the latter on one side of the globe, as the Pacific is on the other. The greatest depth is not more than 3873 fathoms, and the greatest depth of the Pacific is about 4575 fathoms. The greatest depression of the Atlantic

basin is thus only some 8000 feet more than the height of the highest mountain in Europe.

The bed of the Atlantic, from the depth of 400 to 2000 fathoms, is covered by what is known as "Globigerina ooze," while at greater depth this is succeeded by a fine red clay, less calcareous in its nature than the ooze, and the whole is strewn with fragments of pumice and other volcanic products, which, however, are believed to be the result of subaerial volcanic action, and to have been carried out in the course of time. The "Globigerina ooze" is a very interesting substance. Its amazing extent alone, with the fact of its being almost entirely of organic origin, is sufficient to make it important, and it throws a considerable amount of light on the formation of well-known geological deposits of more ancient date. It is, in fact, the chalk formation in the course of growth. It consists, on the surface, of a creamy layer composed of little more than the shells of minute creatures of the class Foraminifera (Globiferina, Pulvinulina, Orbulina, &c.), with a small mixture of imperfectly understood things called Coccoliths and Rhadoliths, and the tests and spines of Radiolaria, the spicules of sponges, and a few shells of Pteropods; while living among the ooze, at least at moderate depth, are many of the Foraminifera themselves, sponges, corals, star-fishes, and higher invertebrates, and a few fishes. Beneath this is a stratum of shells more or less broken, cemented by a calcareous paste; and further down, a nearly uniform calcareous paste coloured gray by decomposing animal matter. It is now believed that all this is formed by the debris of myriads of those minute animals most of which live near the surface, while their dead bodies and shells fall to the bottom, and have been accumulating for countless ages.

A peculiar feature of the Atlantic is the *Mer de Sargasso*, or "Weedy Sea," so called by the early Spanish and Portuguese mariners. This is a vast tract of nearly stagnant water, extending from the meridian of 30° W. to the Bahamas, between the parallels of 19° and 36° N., densely covered in many parts with closely matted sea-weed, *Fucus natans*, one of the most widely distributed of the social sea plants, the habitation of a countless number of marine animals. A well-defined portion is known as the "Fucus Bank of Corvo and Flores," from two of the westernmost islands of the Azores, the nearest land. The vegetation has only been found floating, but from the immense quantities of it, often sufficient to impede the progress of vessels, it is supposed not to be drifted from the coast, but to grow locally on rocks and banks at the bottom of comparatively shallow parts of the ocean, from which it is readily detached after fructification. The appearance of these "sea-weed meadows"—*praderias de yerba*, as they are called by Oviedo—powerfully impressed the mind and excited the imagination of Columbus and his comrades.

It is a known fact that the water of the Atlantic Ocean, in different parts, contains different quantities of salt, and that the specific gravity is less near the poles than near the equator. There is a considerable difference between the specific gravity of the water of the Baltic and Mediterranean seas and the ocean. That of the Baltic contains only one-sixth of the salt which is found dissolved in the ocean, its specific gravity being on an average not more than 1.0049. The Mediterranean Sea contains somewhat more salt than the ocean. To the east of the Straits of Gibraltar the specific gravity of the sea-water is 1.0338; whilst between Cape St. Vincent and Cape Cantin it was found to be only 1.0294.

(See "The Voyage of the *Challenger*: the Atlantic." By Sir C. Wyville Thompson. London, 1879.)

ATLANTIC TELEGRAPHS are the names given to the submarine telegraph cables which unite Great Britain and America. The possibility of connecting the two countries by means of a submarine cable was suggested by

Professor Morse as early as 1843, but the matter remained in abeyance for several years. At length, in 1853, the United States surveying vessel *Dolphin* ascertained the existence of a level plateau, covered with soft ooze, admirably suited as a resting-place for a cable, almost from the coast of Ireland to that of Newfoundland. Immediately afterwards a company was formed to lay a telegraph cable from Nova Scotia to Newfoundland, and thence across the Atlantic. The chief scientific authorities of America took great interest in the project, which was promptly and liberally assisted by the Newfoundland government. In 1856 Mr. Cyrus Field came to England, and in conjunction with Mr. J. W. Brett and Dr. Whitehouse, the electricians, and Sir Charles Bright, the engineer, organized the Atlantic Telegraph Company, with 250 shares of £1000 each. The cable, 2500 miles in length, was completed in 1857, and half of it placed on board the *Agamemnon*, lent by the English government, and the other half on board the *Niagara*, lent by the Americans. The latter vessel commenced paying out from Valentia, on the west coast of Ireland; but when about 280 miles from the coast the cable snapped in 2000 fathoms of water, and as the appliances on board were not sufficient to recover it both vessels had to return, and no further attempt was made that year. Additional capital was raised, nearly 1000 miles more cable manufactured, and another attempt made in 1858. This time the vessels proceeded to the middle of the Atlantic, where a splice was effected, and one proceeded towards America and the other to England. The cable broke when about 150 miles had been paid out, and the *Agamemnon* returned to England for improved appliances and further instructions. These having been obtained she again proceeded to the mid-ocean, and effected another splice, and the paying out was then completed without the least mishap on either vessel. Congratulatory messages were first exchanged between the Queen of England and President of the United States, and in the following three weeks about 400 public and private messages were despatched. Unfortunately, however, the signals then became unintelligible, and the cable has never spoken since. It is supposed it must have been injured by its long detention in tanks during the previous winter. As may be naturally supposed, matters now looked very gloomy for the undertaking—nearly £300,000 having been completely lost. Public confidence was, however, afterwards revived by the results of a scientific commission of inquiry, appointed by the British government, and the examples of the successful laying of other cables in the Mediterranean, the Red Sea, and the Persian Gulf. In the midst of the American war Mr. Cyrus Field, with the help of a few friends, raised £70,000 for a second attempt in the city of New York—one gentleman, Mr. Loring Andrews, contributing no less a sum than 100,000 dollars. On his next visit to England Mr. Cyrus Field was introduced to Mr. Thomas Brassey, who was so impressed by his arguments that he declared it was an enterprise which ought to be carried out, and offered to furnish a tenth part of the required capital. This was a pledge of £60,000, the sum required being £600,000. Mr. John Pender, of Manchester, next undertook to supply a similar amount. The action of these two gentlemen was a turning point in the history of the enterprise, for it led to a union of the firm of Glass, Elliot, & Co. with the Gutta Serena Company, and the formation of a new association, known as the Telegraph Construction and Maintenance Company. With all their efforts in England and America, the promoters of the undertaking had before raised only £285,000. The new company now came forward, and offered to take the whole remaining £315,000, and to make its own profits contingent on success. Mr. (now Sir R. A.) Glass was appointed managing director, and infused energy and vigour into all its departments. Another company was established, under Sir Daniel Gooch, M.P., to purchase the *Great Eastern*, as a suitable vessel

for laying the cable, and Captain (now Sir J.) Anderson was intrusted with her command. Thus organized, the work of making a new Atlantic cable was begun under the superintendence of Mr. Chatterton and Mr. Willoughby Smith; and the whole was completed in about eight months. The cable was much thicker and more costly than the former one, and was tested in every possible way during the manufacture, and as it was got ready it was taken on board the *Great Eastern*, which started on her voyage on 15th July, 1865. At first everything went smoothly, but when the promoters had succeeded in paying out 1200 miles of cable, and had only 600 miles further to accomplish, it was broken, and sank to the bottom. They then returned to England defeated, yet full of resolution to begin anew. A fifth company was now established (the Anglo-American Telegraph Company) to take over the whole management of the enterprise, and secure unity and harmony of operation. It was started by ten gentlemen in London, who subscribed £10,000 each. The Telegraph Construction and Maintenance Company, undaunted by their failure, augmented its capital with a subscription of £100,000. Soon afterwards the books were opened to the public, and in fourteen days the company raised the whole £600,000. Then the work began again, and went on with speed. It was only on the 1st of March, 1866, that the new company was formed; it was registered the next day; and such was the vigour and despatch displayed, that in four months from that date the cable had been manufactured and shipped on board the *Great Eastern*. A difference in the manufacture of the new cable made it lighter, and at the same time increased its strength. The whole length of cable, from Valentia in Ireland to Heart's Content in Newfoundland, was this time paid out without a mishap of the least importance, and after communication between the two countries had been thoroughly established, the *Great Eastern* proceeded to the place where the cable of 1865 had broken, although the attempt to recover it was looked upon by many as a very foolish and hopeless one. It proved, however, thoroughly successful in the end, although the cable was caught several times before it could be brought on board. When that satisfactory feat was at last accomplished, messages were immediately transmitted through the cable, and it was found that the insulation was just as perfect as when it had broken the year before. A splice having been effected the *Great Eastern* again sailed for Heart's Content, which she reached in safety, and thus succeeded in laying a second cable between the Old and New Worlds. Both cables for a long time worked with the greatest success, and answered the most sanguine expectations formed of them. In fact, so successful did they prove that in 1869 a third cable was laid across the Atlantic—that known as the French Atlantic Cable, although it was manufactured in England, laid by English ships, and its directors and shareholders are to some extent English. It owed its origin, however, entirely to French enterprise, and Frenchmen subscribed liberally towards it. The main part of this cable extends from Brest to St. Pierre, a small French island south of Newfoundland, and is thence carried to the coast of the State of Massachusetts. It was much longer and laid in deeper water than any cable ever before submerged. The vital part, or the "core," of the cable is a copper conductor of seven wires twisted together, insulated by four concentric coatings of gutta percha, separated from each other by an equal number of coatings of the material known as "Chatterton's compound" (a solution of gutta percha and tar), exactly after the pattern of the cores in the previous Atlantic cables—the only difference between them being in the weight of the conductor, which in the French cable is 400 lbs. per mile instead of 300 lbs. This increase was to compensate for the additional length of the cable. Experiments had shown that the speed of signalling through submarine cables varies inversely according to

their length, and directly as the weight of the conductor; so that, by adding to the weight in due proportion to the increased length, the speed obtained is the same as through a shorter cable. The core is surrounded with a serving of yarn, called the "wet serving," allowing of the ready access of the water to the core. This serving was formerly saturated with tar, but experience showed that, should a slight defect occur in the gutta percha, the tar from the serving, being in itself an insulator, would sufficiently stop it up to prevent its being discovered by the electrical tests, until perhaps it was too late to remedy it. The wet serving, however, containing no insulating fluid, permits of the instant detection of a fault. Around the serving are twisted spirally ten homogeneous iron wires galvanized, each of them embedded in five strands of Manila hemp. The cable thus completed is of a diameter of about $1\frac{1}{2}$ inch, weighing 36 cwt. to the mile, and capable of bearing a strain of 7 tons. The whole work, including the fitting out of the *Great Eastern* steamship which laid it, occupied little more than eight months. The paying-out apparatus contained all the improvements that science and experience had suggested, and the cable was laid without the least serious mishap—the expedition starting from Brest on 21st June, 1869, and the American end of the cable being safely landed at Duxbury, near Boston, on the 23rd of July. Subsequently the Anglo-American Company laid down three more cables; another was laid by a separate British company, called the Direct United States Cable Company; and others have been laid since by American companies and capitalists. In 1886 there were eight or nine valid cables across the Atlantic, with others capable of repair if necessary. The duration and usefulness have been found to vary greatly, but some of the cables have stood tear and wear remarkably well. The English lines are now practically under one organization, and they work to some extent in harmony with the American companies. From time to time as each competing company started there was a war of rates; but the advantages of union over competition are so great, that it is probable the different companies will continue to arrange to share the business equitably and charge the same tariff.

ATLANTIS, a large island which, according to a Greek legend, was situated in the Atlantic Ocean, beyond the Pillars of Hercules (or modern Straits of Gibraltar). It is described by Plato, who professes to have obtained his information from the Egyptian priests, as larger than Libya and Asia Minor together; as adorned with woods and bowers and sunlit pastures, with sparkling fountains and crystal rivers. He represents it, however, as having sunk into the sea 9000 years before his time, rendering the ocean impassable by ships through the huge shoals which its submersion had caused. The "New Atlantis" is the title of an allegorical fiction by Lord Bacon.

ATLAS is the historical and geographical name of an extensive mountain system, which covers, with its ranges, branches, and table-lands, the north-western part of Africa. Its southern boundary lies between 27° and 32° N. lat., from Cape Nun on the Atlantic Ocean to the Gulf of Gabes, or the Little Syrtis, opposite the island of Jerbi; the northern is formed by the southern coast of the Mediterranean Sea, between Cape Spartel at the Straits of Gibraltar and Cape Bon, lying E.N.E. of the town of Tunis. The coast formed by its offsets and terraces along the Atlantic Ocean extends upwards of 600 geographical miles, and is partly low and sandy and partly rocky, but does not rise to a great height, except at Cape Geer and a few isolated places of small extent. The coast along the Mediterranean between Cape Spartel and Cape Bon is generally rocky and high; in many places the elevation is very great, and it continues for a considerable extent. The southern boundary is separated by low sandy hills from the great Sahara Desert. The Atlas system, covering 500,000 square miles,

and inclosing the countries of Fez, Morocco, Algeria, and Tunis, consists of mountain-ranges, valleys, and plains. The chief range has a general direction of W.S.W. to E.N.E. It contains the highest of the Atlas summits (13,000 feet), and gives origin to many large rivers. Up to the boundary between Morocco and Algeria, this principal range is often called the Greater Atlas, while further eastward it is known as the Little or Lesser Atlas. The highest point of the Great Atlas, which had never before been ascended by a European, was successfully scaled in 1871 by Dr. Hooker and two companions.

As the Atlas Mountains in some places rise above the line of perpetual congelation, and as, at the same time, the southern declivity is turned towards the great African desert, it is of course to be presumed that on the sides of the Atlas the most signal extremes and variations of temperature occur. On the low plains at the southern foot of the mountains, and within its lower ranges, the date palms cover extensive tracts; the higher lands abound in gum trees, almonds, olives, and other productions of the hotter countries; the lower table-lands produce apples, pears, cherries, walnuts, apricots, and other fruits common to the southern countries of Europe; and, proceeding higher up the ranges, the plains are covered with pines of an immense size, with a species of oak called the *belute*, with ferns, elms, mountain-ash, and several species of juniper. Higher up large forests of firs form the principal vegetation.

Rich mines, chiefly iron, copper, and lead, exist in that lateral range which separates the province of Suse from the countries on the river Draha.

ATLAS, in the Greek mythology, was the brother of Prometheus and Epimetheus, and with the other Titans warred against Olympus. For this his punishment was to bear heaven on his shoulders, or as Homer puts it, to bear the long columns which separate heaven and earth. Prometheus came and asked him for shelter, and on his refusal turned him to stone with the Gorgon's head, which he carried. This was probably the Atlas in the N.W. of Africa, because we find the great-grandson of Perseus (HERACLES) journeying to find Atlas beyond Scythia, amongst the "blameless Hyperboreans," after setting free his brother Titan Prometheus from his prison in Caucasus. His errand was to procure the apples of the Hesperides, and Atlas engaged to pick them for him. When Atlas got free of the weight of heaven, which Heracles bore meanwhile, he was in no haste to return to his labour, though he brought back the apples. Heracles pretended to be quite ready to relieve him, if Atlas would take up the world, while he sought a pad for his head; but when Atlas unsuspectingly resumed his old position Heracles made off. Atlas was the father of the PLEIADS, HESPERIDES, and HYADES.

ATLAS, in anatomy, is the name given to the first vertebra of the neck—because as **ATLAS** the Titan bore heaven, so this bears the skull. It will be found figured, with the second vertebra, the **AXIS**, in our Plate II., BACKBONE (figs. 1, 2, 3). The two together form the finest example of the pivot-joint in the body. Fig. 1 is the atlas seen from beneath, *f f* the lower articular surfaces to receive the axis. Fig. 2 is the same seen from above, *e e* the concavities forming the upper articular surfaces for the reception of the condyles of the skull, which play upward and downward upon them. Fig. 3 is the axis seen sideways; *e* is one of the two surfaces on which the lateral mass of the atlas slides, and *j* is the peculiar *odontoid process* or peg which fits into the back part of the opening through the atlas, and is held there by a strong ligament. Thus the nodding of the head is effected by the movement of the skull upon the atlas; while, in turning the head from side to side, the skull does not move upon the atlas, but skull and atlas together slide as one mass round the odontoid peg of the axis. Two strong ligaments, called check ligaments, pass from the

apex of the odontoid peg of the axis to either side of the margins of the occipital foramen, their function being to check excessive rotation of the skull.

ATLAS is also the name given to a collection of maps. The derivation of the term is doubtful. Johnson says that it is supposed to be so called from a figure of Atlas supporting the globe prefixed to some such collection. Boucher, in his "Glossary," is disposed to derive the word from the German *atlass*, "satin," the paper on which maps are printed being smooth and satin-like; and a large kind of paper, commonly used as drawing paper, is still called *atlas* paper.

ATMOSPHERE (from the Greek *atmos* and *sphaira*, sphere of vapour) is the whole body of air or other mixture of gases which envelops a planet. We shall here devote ourselves exclusively to that which surrounds the earth, merely observing that we have more or less reason to suppose that there are atmospheres, in some sense analogous to that of the earth, which envelop the Sun, Venus, Mars, Jupiter, and Saturn; and none for the Moon.

By the ancient philosophers the air was considered to be a simple body, and one of the four elements from which all things were formed; and this belief prevailed until the year 1774, when Priestley discovered oxygen gas, and showed that it entered into the composition of the air. Nitrogen, or as it was first called azote, was soon afterwards discovered, and the researches of Scheele, Lavoisier, Cavendish, and others resulted in the discovery that the mean composition of 100 volumes of dry air is as follows:—

Nitrogen,	79.02
Oxygen,	20.94
Carbonic acid,	0.04
	<hr/>
	100.00

In addition to these substances there is always present an amount of aqueous vapour, and very frequently there are found to be traces of ammonia and organic matter, sulphurous and sulphuric acid, nitric acid, sulphuretted hydrogen, carbonic oxide, &c., derived from local sources, and varying greatly as to quantity and influence.

Though the bulk of the air consists of nitrogen, this acts but slightly by its chemical properties, but exercises the all-important effect of diluting the oxygen, which otherwise, from its activity, would prove destructive. It is, however, by the oxygen that animal life and combustion are both supported. The amount of carbonic acid present in the air, viz. 0.04 per cent., or four volumes in 10,000, is also necessary for the support of vegetable life, as plants absorb the carbonic acid, and, exhaling the oxygen, retain and grow by the carbon. It will be thus apparent that in the necessity for respiration animal and vegetable life are mutually dependant. In animal respiration the oxygen is absorbed and returned in combination with carbon, forming carbonic acid. This is going on continuously from millions of animals; but it has been found by careful experiment that the amount of oxygen contained in the air varies, but to an exceedingly small extent. The reason for this is found in the fact that plants, as already stated, reabsorb the carbon, and return to the air the oxygen under the influence of sunshine. At the same time flowers and seeds of plants have also a true respiration, i.e. absorb oxygen and exhale carbonic acid; but this is so small in amount as not to affect the statement just made. The constancy of the elemental proportions is also largely maintained by the enormous bulk of the atmosphere and its constant motion.

Air, like every other gas, exerts an expansive force directly proportional to its density. This expansive force is measured by means of the barometer, the pressure of air per square inch being equal to the weight of the mercurial column supported in a barometric tube of 1 square inch section. The mean height of such a column, at the level

including all hours and seasons, is from 80 to 85 per cent. of saturation.

Some careful and systematic inquiries have been made of late years as to the influence of the conditions of the atmosphere upon human life; and though this branch of study may be regarded as in its infancy, some very interesting results have been obtained. Thus the prevalence of cold weather causes a large increase in the deaths caused by diseases of the respiratory organs, while a continuance of hot weather brings about a high death-rate from disease of the bowels.

The electrical condition of the atmosphere has been the subject of much study, as yet without very definite result. The best authorities (as Quetelet and Sir W. Thomson) incline towards the theory that the lowest stratum of the atmosphere is a non-conductor; but the positive electricity so constantly observable a little above the earth's surface is induced by the negative electricity of the earth itself. The measurements of electricity here spoken of are truly measurements of difference of *POTENTIAL* between the earth and the air; by this is of course meant, between the given point of the earth and the given point of the air. The highly rare upper air is a powerful conductor, herein agreeing with the rarefied gases in *GOESSLER'S TUBES*. The condition of the lower air spoken of above resembles closely the *LEYDEN JAR*, for the non-conducting dense atmosphere close to the earth exactly answers to the dielectric, the glass, namely, which in the Leyden jar keeps apart the positive and negative charges till the electric strain rises to bursting, or till the electricity is discharged by a conductor connecting the two surfaces. We have been considering the atmosphere only, but if masses of cloud are examined they are found to be sometimes positive, sometimes negative; in rainy weather rather more often positive. Then also, by induction, the air, even if at the time in its usual positive condition, would be much altered as large masses of cloud passed through it. Sir W. Thomson found the potential in the island of Arran to increase generally from 23 to 46 volts for a rise of *one foot* in level; but as the wind blew masses of cloud now positively, now negatively charged, across the sky, so the rise in potential was checked or favoured; and the rise was sometimes ten times as much per foot as at other times in consequence. The present theory of thunderstorms will be dealt with under *LIGHTNING*; and for another and most splendid electrical effect in the atmosphere the reader is referred to *AURORA*.

Air, like all gases, is expanded by increase of temperature, in the proportion of $\frac{1}{485}$ of its bulk for every degree. This expansion, of course, diminishes the specific gravity; and the heat which is imparted to the lower strata of air, by contact with and radiation from the earth's surface, thus causes a constant succession of upward currents of warm air, which, being replaced by descending currents of colder air, furnish a continually fresh supply for the wants of animals and plants. The same cause, operating on a large scale, produces wind. The trade winds consist in the flow of air from the north and south, to supply the place of the heated air which ascends in the equatorial regions. Were the earth not to rotate upon its axis, their courses would be due north and south respectively; but in consequence of this rotation, which gives a greater velocity to those portions of the earth's surface which are near the equator than to those which are more remote, these winds have, relatively to the surface over which they blow, a motion from east to west. Hence the trade winds appear as north-east winds in the Northern and south-east in the Southern Hemisphere. The heated air which ascends at the equator flows over northwards and southwards, and in its progress towards the poles becomes, in consequence of the earth's rotation, a south-west wind in the Northern Hemisphere, and a north-west wind in the Southern.

(See "The Atmosphere," translated from the French

of Camille Flammarion, edited by James Glaisher, F.R.S., London, 1873.)

ATOLL is the name given by the natives of the Maldiv Islands to the detached coral formations of which their archipelago is composed. See *CORAL ISLANDS*.

ATOM (Gr. *atomos*, indivisible). Concerning the ultimate state of matter two rival theories were proposed at a very early period by the Greek philosophers, and notwithstanding the progress that has been made in physical knowledge both theories have maintained their ground until the present time. The first of these theories, which was propounded by Anaxagoras, was that of the continuity and infinite divisibility of matter; and the second, propounded by Leucippus, denied its infinite divisibility, and asserted that if division could be carried sufficiently far it would reach a point beyond which it could go no further, as it would reach the small, hard, solid, indivisible particles known as atoms, of which all things are made. These atoms were regarded as moving in a vacuum, the shape varying in different species of matter, and having intrinsic powers of motion. The various solids, liquids, and vapours of which this world consists, were thus regarded as being composed of masses of the various atoms clustered together more or less compactly, but ever with void spaces between them.

Both theories have been advocated by eminent philosophers of more modern times, but the atomic theory in some one of the different forms it has assumed is now generally accepted by physicists. The latest form of the atomic theory is that suggested by Sir W. Thomson, which has been entitled the theory of vortex atoms. [See *VORTEX*.] This eminent physicist has also made some elaborate calculations of the size of atoms, and concludes from his investigations that the diameter of an atom cannot be greater than the 250 millionth of an inch, or less than the 5000 millionth. These dimensions he has illustrated thus—"If a drop of water were magnified to the size of the earth, the atoms of which it is composed would appear larger than small shot, but they would not be as large as cricket balls."

ATOMIC THEORY. The atomic theory is founded upon the old metaphysical notion that all matter consists of "atoms," meaning absolutely indivisible particles. The scientific theory in its present form is a creation of Avogadro's. It assumes that all substances consist of "molecules," which are indivisible only in this sense, that each represents the minimum of a certain kind of substance which exists as such; the molecule of water is the least quantity of water which is water. Molecules, in general, are constellations of "atoms," i.e. of particles of elementary matter indivisible by even chemical forces.

Chemistry and physics are only branches of one science, whose fundamental axiom is that matter and energy are things of entirely different orders, and not convertible into one another, and that consequently both are indestructible and uncreatable by natural agencies. This axiom, being an axiom, is not susceptible of direct demonstration; all we can do is to explain its real meaning, and give an idea of the nature of the evidence which gives us a full conviction of its truth.

A candle when kindled in air burns into apparently nothing but heat. But when we look into the process more closely, we find the heat is accompanied by two things which can be brought into tangible form, namely, by vapour of water and by carbonic acid gas. The former easily, the latter with some difficulty, can be condensed into liquids. But there is a simpler method, which, moreover, has the advantage of absolutely general applicability.

All matter, visible or invisible, has weight, and the weight of a thing (as determined by means of an equal armed balance and a set of standard masses—ounce-weights, grain-weights, &c.) depends only on and is proportional to its "mass"—mass meaning quantity of matter

contained in it. Is this true? The question in its simplest terms obviously comes to this:—A body, 1, weighs w grains, and another body, 11, weighs w grains likewise. Hence, supposing a_1 and a_2 to be the weights of unit of mass, and m_1 and m_2 to be the two masses, we have—

$$m_1 a_1 = m_2 a_2; \\ \text{hence } m_1 = m_2, \text{ q.e.d. if } a_1 \text{ is equal to } a_2.$$

It must be so if 1 and 11 are of the same kind; but does it hold if 1 is gold and 11 is lead, for instance? Newton's pendulum experiments have settled this question finally. He showed that pendula of equal length (at a given time and place) vibrate at the same rate, whatever be the weight or nature of the bob. Hence, *a fortiori*, 1 oz. of (say) gold vibrates as fast as 1 oz. of lead or anything else. Hence the 1 oz. of gold cannot be encumbered with more mass than the 1 oz. of lead, or else it would vibrate more slowly. Hence our ordinary mode of weighing measures masses directly and correctly. To come back to our candle experiment. The carbonic acid and the water produced can be collected conjointly in solid caustic soda, and thus be rendered amenable to the balance. If we weigh them and weigh the burned part of the candle (by difference), we find that they weigh more than the tallow consumed. Whence we conclude that the two products, besides the substance of the candle, contain some of the substance of the atmosphere. Air consists of oxygen and nitrogen; only the former takes part in the process. To pass to another closely analogous case. Charcoal when kindled in oxygen burns into invisible carbonic acid, the material nature of which needs not be demonstrated over again; but here, as in the former case, it would not be unreasonable to suspect a production of part at least of the heat evolved at the expense of the matter concerned in the process. To settle this question, suspend your charcoal within a hermetically closed flask full of oxygen, and after having tared the whole at a balance, fire the charcoal by means of a burning lens or a galvanic current. At the end of the combustion allow the flask to cool, and weigh it again. It weighs precisely as much as before. And so it is with all chemical changes; the sum-total of the matter concerned in a chemical process is an absolute constant, although all these processes involve an evolution or absorption of heat. Hence we conclude that heat is not matter, and if it is not it must be motion. But motion is easily stopped and created; hence, we should say, heat is easily put out of existence without leaving a vestige of itself behind it—an absolute fallacy. Motion, without a thing that moves, has no existence, and taken conjointly with the thing, it represents a certain amount of work, namely, the amount of work required to stop it. Motion *qua* potential work is called kinetic energy, and potential motion, such as is in a stone which lies at the edge of a precipice, is called potential energy. It is the best established proposition of mechanics that in a given system of bodies the total energy, potential *plus* kinetic, is a constant. In apparent contradiction to this, we find that whenever we use a machine to convert work into work of another kind, the work spent is greater than the work realized. If we want to lift a ton (≈ 2240 lbs.) 10 feet by a crane, we must spend $10 \times 2240 = 22,400$ foot-pounds of work at the handle, plus a good many more to overcome the dead resistances, such as friction, stiffness of ropes, &c. In the case of a boring or planing machine, almost all the work spent goes for the dead resistances. What this means was first seen and almost proved by the sagacity of Rumford, to be proved finally by the wonderful experiments of Joule. Overcoming friction means creation of heat; heat is nothing else than the invisible motion of the molecules of the hot body, and every foot-pound of energy lost (over the friction, &c.) corresponds to a constant number of units of heat produced, which, according

to Joule, is very nearly equal to $\frac{1}{772}$ of a unit of heat, i.e. sufficient to raise the temperature of $\frac{1}{772}$ of a pound of water by 1° Fahr. In calculating the effect of a machine, add 772 foot-pounds for every unit of heat produced to the visible work done, and the sum is equal precisely to the number of foot-pounds invested.

Heat, then, as we see, is creatable and destructible *as heat*, but the total energy involved always remains the same. This, without any qualification, applies to chemical processes; hence, the heat evolved in our charcoal experiment must be traced back to the invisible potential energy in the particles of the charcoal and the oxygen which has been set free, so to say, in the kinetic form of heat—not exhaustively, because the carbonic acid produced must be supposed, and is well proved, to have energy in itself of both the kinetic and the potential kind.

We are now in a position to put a new interpretation on our charcoal experiment. As the heat produced cannot have come out of the matter concerned, and the weight, by experiment, has remained constant, the weight of unit-mass a must have remained constant; the a is the same for the charcoal and the oxygen conjointly as for the carbonic acid. And so it is in all chemical reactions, although body (or set of bodies), A , changes into a *new* system, A_1 , the original a and the final a are the same. This makes us independent of Newton's experiments, if we may be permitted to extend the experience to couples of bodies which are not convertible into each other. In any case there is no doubt about the constancy of mass in chemical changes. But there is another something which remains unchanged, namely, the absolute elementary composition of the system. The following example illustrates what is meant—

Take exactly 1 oz. of pure silver, dissolve it in nitric acid; the silver *qua* substance is gone, but its matter must be supposed to be concealed in the solution. By evaporating the solution to dryness you obtain a white crystalline salt called nitrate of silver. By heating silver with oil of vitriol we can convert it into sulphate of silver, a salt similar to, but by no means identical with, the nitrate. From the solution of either in water we obtain, by addition of common salt solution, a precipitate of what is called horn-silver. By burning our silver in sulphur-vapour we cause it to pass into a black crystalline non-metallic sulphide. The nitrate, the sulphate, the horn-silver, the sulphide are so many substances, all as homogeneous as silver itself, but different from it and one another; and yet any one of them, when heated to redness in hydrogen gas, relapses into the original form of metal; and, if we have worked carefully, the whole of our ounce of silver comes back to us—not a thousandth part of a grain is lost or created anew. That absolutely unchangeable something in silver which survives all chemical tortures is called the *element* silver, in opposition to silver, the substance. There are some sixty-five other elements besides silver; their number increases constantly through new discoveries. All substances, if not elementary, are compounds formed by the union of two or more of the sixty-six elements with one another. A chemical reaction, however great the heat evolution or the change in properties involved, is nothing more or less than a rearrangement of the several portions of elementary matter present in the co-reagents into new combinations. The law of the conservation of energy, in its widest significance, can be explained theoretically, proved mathematically, in fact, if we assume that all matter consists of *separate particles*, the action of which on one another is fully determined by their masses, and the distances of their centres from one another. Helmholtz proved this as early as 1848, and no flaw has been discovered in his reasoning. Hence the law of the conservation of energy affords, to say the least, a strong apology for the notion of atoms; and another and more powerful argument in its favour is

afforded by the law of the specific indestructibility of elements. But we need no apologies for the atomic theory, because it is proved—as far as the truth of a theory is susceptible of proof—by the quantitative laws of chemical combination and decomposition.

To explain these laws let us confine ourselves, for a beginning, to the case of binary oxides, meaning bodies formed by the union of oxygen with one other element. *A priori* there is no reason why, for instance, a metal should not be able to combine with any proportion of oxygen from a certain lower limit, p , up to a certain maximum, P ; and there are cases where it would almost appear to be so. Binoxide of manganese (well known in the arts as a reagent for producing chlorine) contains 36.90 per cent. of oxygen, and 63.10 per cent. of the metallic element manganese. This oxide under no circumstances takes up additional oxygen; but when heated to redness in air it loses oxygen, and ultimately leaves a brown residue containing only 27.95 per cent. of the non-metallic element. When heated to the same temperature in oxygen gas it leaves a black oxide containing 30.38 per cent. of oxygen. Now, air is nothing but dilute oxygen; hence we should presume that if, in a series of experiments, we started with air, and then used successively mixtures of air with more and more oxygen, we should obtain a corresponding series of manganese oxides, and probably thus be able to bring about any percentage of oxygen from 27.95 up to 30.38. The writer of this article tried the experiment in many forms, but found that while the composition of the gaseous medium varies from pure nitrogen up to pure oxygen, only the black oxide or the brown is produced, the former as long as the percentage of oxygen in the gas is above, the latter whenever it falls below a certain percentage (which lies at about 26, a little higher at higher, a little lower at lower temperatures than a certain degree of red heat). Any of the three oxides named, when heated in hydrogen gas, loses part of its oxygen as water, and becomes manganous oxide, which contains 22.53 per cent. of oxygen. A similar law of discontinuity governs the oxides of all other elements. Before giving further illustrations we will first introduce a system of representing composition which will enable us conveniently to compare all our oxides with one another. For this purpose it is obviously expedient to reduce all the compositions to unit-weight of the constant element. Applying this rule to the case of manganese we have, per unit-weight of oxygen—

In manganous oxide,	3.43 of metal.
" the brown "	2.573 "
" the black "	2.287 "
" the peroxide,	1.715 "

Ex. 2. A ribbon of magnesium metal, when kindled in air, burns brilliantly into magnesia, which contains 1.50 parts of magnesium per unit of oxygen. This is *the only known oxide* of the metal.

Ex. 3. Hydrogen and oxygen gases mix readily in any proportion, forming permanently homogeneous mixtures. In any such mixture chemical combination can be induced by application of heat, but the product is always the same, namely, *water*, which contains 0.125 part of hydrogen per 1 of oxygen. By indirect methods another oxide can be produced, which contains only .0625 of hydrogen per 1 of oxygen.

Ex. 4. Carbon forms two (gaseous) oxides, known as carbonic oxide (1 of oxygen + 0.750 of carbon) and carbonic acid (1 of oxygen + 0.375 of carbon).

Ex. 5. Sulphur, by its combustion in oxygen, is converted into sulphurous acid gas (1 of oxygen + 1 of sulphur), which by certain methods can be further oxidized into (solid) sulphuric acid (1 of oxygen + 0.667 of sulphur).

Ex. 6. Nitrogen oxides cannot be produced directly, but by indirect means five oxides of the element have been ob-

tained, in which unit-weight of oxygen is combined with 1.75, .875, .583, .437, .350 of nitrogen.

Ex. 7. Chlorine (again only indirectly) combines with oxygen in two proportions, viz. in those of 1 of oxygen to 4.44 and 1.11 of chlorine.

It is impossible to go over this statement without being struck by the numerical simplicity of some of the ratios quoted. It is remarkable that sulphur combines with just its own weight of oxygen into sulphurous acid; magnesium with exactly $\frac{3}{4}$ times, hydrogen with 8 times, carbon (in carbonic oxide) with $\frac{1}{2}$ times its weight. We single out these cases because their numerical simplicity, as far as we know, is purely accidental, or, to speak more correctly, unexplained as yet. Numerical simplicity in the composition of a single compound, in fact, is the exception. It is an illustration of a *general* rule, on the other hand, if we find that whenever one of our elements forms two or more oxides, the several weights of radical united with unit-weight of oxygen bear simple numerical ratios to one another, each to each, and consequently are all integer-multiples of a certain constant weight of the respective radical. Thus we have for radical per unit-weight of oxygen, in the oxides of—

<i>Manganese:</i> 3.43; 2.573; 2.287; 1.715; or, 3.43; $\frac{3}{4} \times 3.43$; $\frac{2}{3} \times 3.43$; $\frac{1}{2} \times 3.43$; or (12; 9; 8; 6) times "mn," where mn = .2858 part of manganese.
<i>Magnesium:</i> "mg." = 1.50 only.
<i>Hydrogen:</i> (1 and 2) times h; h = .0625.
<i>Carbon:</i> (1 and 2) times c; c = .375 part of carbon.
<i>Nitrogen:</i> (60; 30; 20; 15; 12) \times n, where n = .02917 part of nitrogen.
<i>Chlorine:</i> (1 and 4) times cl, where cl = 1.11 part of chlorine.
<i>Sulphur:</i> (2 and 3) times s, where s = 0.333 part of sulphur.

The same rules hold for any other binary oxides, or indeed for any set of bromides, sulphides, &c., that we might have quoted; but the most remarkable fact is, that these chemical prime factors—mg, mn, h, c, n, cl, s—hold good for all compounds, binary, tertiary, quaternary, &c., of our elements with one another in this sense, that, for instance, the compositions of all the thousands of known compounds of carbon, hydrogen, oxygen, nitrogen, chlorine, can be expressed by formulas—

$$\alpha \times c + \beta \times h + \gamma \times O + \delta \times n,$$

where O means 1 part of oxygen, while α , β , γ , n , are integers. This system of formulae composition is universally used by chemists; only to gain greater simplicity we substitute for c, h, n, &c., certain integer-multiples of these as (more convenient) "combining weights." The following values and symbols are generally adopted:—

	Combined Weight.	
Oxygen,	1	= O (arbitrary unit).
Hydrogen,0625	= H = h.
Nitrogen,875	= N = 30 \times n.
Carbon,750	= C = 2 \times c.
Sulphur,	2.000	= S = 6 \times s.
Chlorine,	2.22	= Cl = 2 \times cl.

These numbers, of course, have a purely relative meaning; we might just as well take the combining weight of carbon or nitrogen = 1. For H = 1 we have O = 16; N = 14; C = 12; S = 32; Cl = 35.5, which set is preferred by most chemists on account of its accidental numerical simplicity. They are relative also in this sense, that (for H = 1) N' = 7; C' = 6; S' = 16; Cl' = 71, for instance, would of course do equally well as "combining units."

In giving the formula of a body it is customary to dispense with the symbols + and \times ; thus, for instance, instead of formulating the composition of water as 1 \times O +

$2 \times \text{H}$, we write OH_2 ; instead of $1 \times \text{N} + 3 \times \text{H}$ (for ammonia), we say NH_3 , &c. $\text{NH}_3 + \text{H}_2\text{O}$ means (for $\text{H}=1$) 17 parts of ammonia taken along with 18 parts of water; $\text{NH}_3 \cdot \text{H}_2\text{O}$ means a compound of 17 parts of ammonia with 18 parts of water. A factor placed before a formula multiplies the whole up to the next +; thus $3\text{NH}_3 + \text{H}_2\text{O}$ means three times NH_3 + once H_2O . If we mean to say 3 times $\text{NH}_3 + 3$ times H_2O , we put it $3(\text{NH}_3 + \text{H}_2\text{O})$ or $3\text{NH}_3 + 3\text{H}_2\text{O}$. In this manner we can condense the whole of the balance-sheet of a chemical reaction into a very few symbols. Thus, for instance, we write $\text{H}_2\text{O} + \text{K} = \text{KHO} + \text{H}$ (where, for $\text{H}=1$, K means 39 parts of potassium) instead of saying—"In the action of potassium on water every 39 parts of the metal decompose 18 parts of water to form 56 parts (=39+1+16) of caustic potash and 1 part of hydrogen." All chemical equations are not as simple as the one we chose for our example; but in all cases it is possible to do full justice to the experimentally established relations, without using other numbers than integers for either the coefficients of the several terms or those of the combining units. Only in a great many cases these latter coefficients assume pretty considerable values. And this suggests the question—Have we any right to look upon our relative units, $\text{C}=12$; $\text{H}=1$; $\text{O}=16$ (meaning, of course, $\text{C} \div \text{H}=12$ unit-weights of carbon, &c.), as natural constants? Let us begin by proving the relevancy of the question in reference to two large families of compounds, which include certainly one-half of what is most thoroughly studied in our present chemistry.

1. Carbon and Hydrogen unite into numberless "hydrocarbons" corresponding to a long chain of compositions which begins with that of marsh gas, CH_4 , and terminates with that of chrysene, $\text{C}_{18}\text{H}_{12}$ (taking $\text{C}=12$; $\text{H}=1$). Between these two lie a host of formulas (C_nH_m); the sum $\alpha + \beta$ varying from 5 to something like 37 or 40. What in each case the analysis determines more directly is the ratio $\frac{\alpha}{\alpha+\beta}$, which, as we see, varies from 0.2 (for CH_4) to 0.6 (for $\text{C}_{18}\text{H}_{12}$), the relative error being about ± 0.01 of the ratio. Now, supposing we calculate the decimal values of all the really different ratios $\frac{\alpha}{\alpha+\beta}$ up to, say, $\alpha + \beta = 10$, and arrange the results in the order of their magnitudes, excluding what lies below 0.2 or above 0.6; we then extend our table successively up to $\alpha + \beta = 11, 12, 13$, &c., until we find that the greatest difference between two successive terms is no more than 0.02 of the less term, i.e. until we have a practically complete catalogue of all the values which analysis can discriminate. Supposing we had to go up to $\alpha + \beta = 100$ (as against the $\alpha + \beta = 37$ in our actual formulas), this would lend probability to the existence of a law as the cause of our integer-ratios; the numerical value of this probability would be

$$1 - \frac{1 \cdot 2 \cdot 3 \cdots n}{N(N-1) \cdots (N-n+1)},$$

where n is the number of entries in our table up to $\alpha + \beta = 37$, and N the very much greater number of entries up to $\alpha + \beta = 100$. Well, the writer some years ago calculated such a table up to $\alpha + \beta = 60$, which shows that even if we stop at $\alpha + \beta = 37$ our catalogue is to all intents and purposes complete. It would appear to be at best an even chance whether the law exists or not. To put it in another way:—Supposing we adopt $\text{H}=1$ and $\text{C}=11$ as our basis, and reconstruct our formulas, we then have for our limit ratios (the easily calculated) values 0.214 and 0.621. For $\text{C}=13$ we should have 0.187 and 0.581. Our catalogue up to $\alpha + \beta = 37$ remains as complete as before.

2. As a second example we will take up the very numerous family of bodies $\text{C}_n\text{H}_m\text{O}_p$. In this case anything like general reasoning becomes difficult. But we are safe in saying that by giving 60 as a maximum for $\alpha + \beta + \gamma = s$ in the existing formulas, we remain within the

mark. A glance at the writer's table of values $\frac{\alpha}{s}$ up to $\gamma=60$, on the other hand, would, we feel sure, satisfy any arithmetician that the table supplies a sufficient selection of values for any set of values, $\alpha : s$; $\beta : s$; $\gamma : s$, that falls at all within the area of actually observed values; notwithstanding the onerous condition that in the three ratios, $\alpha_1 : \gamma$; $\alpha_2 : \gamma$; $\alpha_3 : \gamma$, substituted for the decimal values $\alpha : s$; $\beta : s$; $\gamma : s$, the γ must be the same all round. As general reasoning is impossible, let us give one example out of many which we might quote.

The composition of cane-sugar is generally translated into the formula $\text{C}_{12}\text{H}_{22}\text{O}_{11}$, which of course corresponds to the correct percentages of the three elements; but as these are uncertain, other independent formulas are just as good, and it is remarkable that one of these at least is less complex than the adopted one. We have in fact—

Percentages.	Calculated from	
	$\text{C}_{12}\text{H}_{22}\text{O}_{11}$	$\text{C}_{11}\text{H}_{20}\text{O}_{10}$
Carbon,	42.11	42.31
Hydrogen,	6.43	6.11
Oxygen,	51.46	51.28
	100.00	100.00

And if analysis is not competent to discriminate between 12.22:11 and 11:20:10, it cannot reveal the constants $\text{C}=12$; $\text{H}=1$; $\text{O}=16$. In fact, try $\text{C}=1$; $\text{H}=1$; $\text{O}=1$, and you find that $\text{C}_{19}\text{H}_{13}\text{O}_{23}$ works quite well.

$\text{C}_{19} - 19$	42.22
$\text{H}_3 - 3$	6.67
$\text{O}_{23} - 23$	51.11

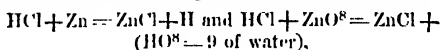
45 parts. 100.00 parts.

From this example (which is only one of many that we might have quoted), and from what we learned regarding the hydrocarbons, it really would appear that our combining weights, and consequently also the formula-values of the several compounds (e.g. the value $18 \times \text{H}$, or $1.125 \times \text{O}$ of water represented by H_2O), are not natural constants, but more arbitrary units. But supposing even this were so, it would not affect our system of formulas as an arithmetically sound and convenient mode of representing composition; and if we retain this system, it obviously commends itself, if possible, to so construct our formulas that in each case the coefficients (the α, β, γ in $\text{C}_\alpha\text{H}_\beta\text{O}_\gamma$) reduce the explanation of chemical substitutions within the body, and the formula-value itself, that of the cases of chemical addition or decomposition, to the highest attainable degree of numerical simplicity. Let us try a few cases, and begin with

Water.—If we had nothing but the analysis to go by, the formulas H_2O ($\text{H}=1$; $\text{O}=1$) and HO ($\text{H}=1$; $\text{O}=8$) would suggest themselves as the best. But the simplicity of the 8 is a mere accident (there are good reasons, in fact, for assuming that the true value lies closer to 7.98); we therefore provisionally adopt HO for explaining our reactions. Cases of addition are obviously of no use to us here. From the fact, for instance, that 9 parts of water combine with 28 parts of quicklime we can draw no conclusion, because for us the formula of quicklime has no existence yet. We accordingly pass to substitutions. A good example to choose is the action of potassium on water, which (as already explained incidentally above) results in this, that one-half of the hydrogen goes out and is "replaced" by its equivalent of potassium ($\text{K}=39$ grains for every $\text{H}=1$ grain of hydrogen.) The simplicity of the ratio 1:2 might be accidental, but it so happens that sodium, rubidium, lithium, act in a precisely similar man-

ner, while, for instance, zinc replaces the whole of the hydrogen and produces an oxide ZnO ($\text{Zn} = 32.5$; $\text{O} = 8$) from what was originally H_2O . There is no case in which $\frac{1}{2}$, $\frac{1}{3}$, &c., of the hydrogen is replaced with formation of a definite compound. The divisibility of the hydrogen into two halves must have a natural cause, and to embody this law in our formula we must multiply it by 2, which leads to H_2O_2 . But the oxygen is not divisible at all; hence we write H_2O where (for $\text{H} = 1$, which we will now retain as our arbitrary unit) $\text{O} = 16$. And this formula, as we might show if we had the space, is brilliantly confirmed by all the reactions in which water figures either as a co-reagent or product.

Hydrochloric Acid, by analysis, is HCl , where $\text{Cl} = 35.5$ parts of chlorine. The chlorine is unreplaceable. The hydrogen is readily replaced by the action of basic oxides, or (sometimes) that of the respective metals. Thus we have:—



and similarly in dozens of analogous cases. Never is the hydrogen taken out and replaced in instalments. Hence H_2Cl_2 or HCl stands as the formula.

Ammonia, by analysis, is Hn , where $n = 4.667$. But ammonia has quite a characteristic tendency to combine with hydrochloric acid and other "acids" (meaning analogously constituted hydrogen compounds), and in all cases 17 parts = 3Hn of ammonia combine with the acid per $\text{H} = 1$ part of hydrogen in the acid. Thus $\text{HCl} + 3\text{Hn}$ gives sal-ammoniac CH_4N_3 . Of substitutions there is a legion, but they all agree in this, that they divide the hydrogen into three equal parts, and that one of these, or two, or all the three, are replaced by other things. Just to give one example, we have $\text{n}_3\text{H}_3 + \text{K} = \text{H} + \text{n}_3\text{KH}$. But the n_3 is indivisible chemically; hence " NH_3 " is the formula, where $\text{N} = 3n = 14$ parts of nitrogen.

Marsh Gas is He , where $e = 3$ parts of carbon. The carbon is indivisible, but the hydrogen can be replaced by chlorine in parts by treatment with free chlorine gas. In all cases the hydrogen goes out as hydrochloric acid and is replaced by precisely the same weight of chlorine ($\text{Cl} = 35.5$ per 1 of H) as goes off as HCl . In this manner four substitution products can be produced, namely (from e_3H_4), $\text{e}_3\text{H}_3\text{Cl}$, $\text{e}_3\text{H}_2\text{Cl}_2$, e_3HClCl_2 , e_3Cl_4 . The formula clearly is CH_4 , where $\text{C} = 4e = 12$. To the same value we come in the study of carbonic acid and carbonic oxide, which for $\text{C} = 12$ contain 16 and 32 parts of oxygen respectively. Now, $12 + 16 = 28$ parts of carbonic oxide when burned in oxygen take up 16 of oxygen, and form $12 + 16 + 16 = 44$ parts of carbonic acid. Hence the expediency of writing CO and CO_2 ($\text{O} = 16$) for carbonic oxide and carbonic acid respectively, and these formulas are amply confirmed by the study of other reactions concerning the two compounds. Thus, for instance, $\text{CO} + \text{Cl}_2 = \text{COCl}_2$, where Cl_2 is just twice that 35.5 which we came across before, just so as $\text{O} = 16$ came back to us with this value, although *a priori* there was no reason why the marsh gas combining-weight of carbon might not demand, for instance, once 17 and twice 17 of oxygen.

Alcohol.—The composition, when referred to unit-weight of carbon, is $1 \times \text{C} + 0.25 \times \text{H} + 0.667 \times \text{O}$. By the action of sodium $\frac{1}{2}$ of the hydrogen is turned out and replaced by its equivalent ($\text{Na} = 23$ per $\text{H} = 1$) of sodium. Hydrochloric acid turns out all the oxygen with formation of water and chloride of ethyl, a body which per 1 part of carbon contains $\frac{1}{2}$ of 0.25 part of hydrogen, and, for every unit in the $\frac{1}{2}$ of the hydrogen that is gone, $35.5 = \text{Cl}$ of chlorine. By the action of vitriol all the oxygen and a portion of the hydrogen equal to $\frac{1}{2}$ of the weight of the oxygen, i.e. $\frac{1}{2}$ of the 0.25 of hydrogen, go out as water, and there results olefant gas $= 1 \times \text{C} + \frac{1}{2} \times 0.25 \times \text{H}$. Hence, so far, the hydrogen is subject to chemical division into 6

equal parts; and the formula must be referred to $6 \times \text{H} = 6$ of hydrogen, when we have $24 \times \text{C} + 6 \times \text{H} + 16 \times \text{O}$, or $\text{C}_4\text{H}_6\text{O}$, where $\text{O} = 16$ as before, but $\text{C}_4 = 24$ as the carbon combining-weight in alcohol.

Let us now consider a reaction in which alcohol figures as a product—namely, that of vinous fermentation. In this reaction grape sugar (empirically $12 \times \text{C} + 2 \times \text{H} + 16 \times \text{O}$, where $\text{C} = \text{H} = \text{O} = 1$) breaks up, so that $\frac{1}{2}$ of the carbon goes off as carbonic acid, while $\frac{1}{2}$ remain as alcohol. Let us venture from this upon building up the formula of grape sugar, $\text{C}_{12}\text{H}_{22}\text{O}_{11}$. We have $\text{C}_{12}\text{H}_{22}\text{O}_{11} \gamma = \text{CO}_2 \cdot \frac{1}{2} \text{C}_2\text{H}_4\text{O} = (\text{C} + \text{C}_2) \text{H}_6\text{O}_3$, for which it is obviously expedient to substitute $\text{C}_3\text{H}_6\text{O}_3$, which, as we see, agrees with the analysis of grape sugar. Now grape sugar can be made from cane sugar by *chemical* addition of the elements of water, the added-on water being very nearly $\frac{1}{2} \text{H}_2\text{O}$ per CH_2O of grape sugar produced, or 1 H_2O per $12 \times (\text{CH}_2\text{O})$ of grape sugar. Whence the expediency of taking $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ as the formula for cane sugar. The fermentation of cane sugar, then, is explained with sufficient correctness by the equations $\text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O} = 4\text{C}_3\text{H}_6\text{O}_3$, and every $1\text{C}_3\text{H}_6\text{O}_3 = \text{CO}_2 + \text{C}_2\text{H}_4\text{O}$. Just try to formulate the same facts by means of the other two formulas for cane sugar, which mere analysis gives us the choice of, along with our adopted formula, and you will see why we reject these other two as decidedly inconvenient formulas.

We need no further examples to enable the reader to understand what we mean by saying that, whichever compound of C , H , and O we investigate, the substitutions always point to one set— α , γ , β —for the coefficients, and from this set, and the elementary analysis, the relative values of C , H , O follow as a matter of mere arithmetic; and we always find that for $\text{H} = 1$ we have—

$$\begin{aligned} \text{C} &= 12 \text{ or } 24 \text{ or } 36, \text{ \&c.; not } 6, 3, \text{ \&c.}, \\ \text{O} &= 16 \text{ or } 32; \text{ never } 8 \text{ or } 4, \text{ \&c.} \end{aligned}$$

not to speak of 7 or 15, &c.; and if we take in chlorine or nitrogen compounds we have—

$$\begin{aligned} \text{Cl} &= 35.5 \text{ or } 71, \text{ \&c.} \\ \text{N} &= 14 \text{ or } 28, \text{ \&c.} \end{aligned}$$

These values, $\text{C} = 12$; $\text{O} = 16$; $\text{N} = 14$; $\text{Cl} = 35.5$ (for $\text{H} = 1$) must have a natural basis, and the only interpretation we can reasonably put upon them is to take them as being the *relative weights of the respective atoms*. And this result is confirmed by independent evidence, as we shall now proceed to show under the heading of—

Avogadro's Law.—In all perfect gases the volume, at constant temperature, is inversely proportional to the pressure (or tension) of the gas; and the volume, at constant pressure, is proportional to the temperature counted from a certain point, which in the centigrade scale is marked -278° ; or, to speak mathematically, we always have

$$\frac{V}{278 + t} P = \text{constant}.$$

All vapours even are (practically) perfect gases as long as, at moderate pressures, their temperature raises them sufficiently beyond their point of condensation into liquids. Hence the specific gravity (S) of a perfect gas, when referred to that of another perfect gas of the same temperature and pressure (or, more generally speaking, equivalent conditions of temperature and pressure in regard to volume), has a constant value independent of the t and P chosen. What does it depend on? A very clear answer is suggested by the following table, which in column 2 gives the values, S (referred to S for hydrogen as unity), and in columns headed C , H , O , N , the weights of carbon, hydrogen, oxygen, nitrogen, contained in S parts of the gas named in column 1.

Name.	S.	8 Parts contain			
		C.	H.	O.	
Hydrogen, . .	1	0	1	0	0
Oxygen, . .	16	0	0	16	0
Nitrogen, . .	14	0	0	0	14
Steam, . .	9	0	1	8	0
Ammonia, . .	8.5	0	1.5	0	7
Marsh gas, . .	8	6	2	0	0
Cyanogen, . .	26	12	0	0	14
Propylamine, .	20.5	18	4.5	0	7
Benzoic acid,	61	42	3	16	0

We need not go any further, the law stares into our face; the carbons are all integer-multiples of 6, the hydrogens of $\frac{1}{2}$, the oxygens of 8, the nitrogens of 7—obviously because the values, S, although meant to represent merely the relative weights of equal volumes, are at the same time the relative weights of the molecules, and the numbers given under C, H, O, N, being the relative weights of the elements contained in the molecules, must be integer-multiples of the atomic weights. If so, then, taking the weight of one molecule of hydrogen as our unit, and C, H, O, N, as symbols for the atomic weights of the respective elements, we have $H = \frac{1}{2}$ = consequently to half a molecule; hence—

1 mol. of hydrogen = $H_2 = 1$ (assumed).

1 " oxygen = $O_2 = 16$

1 " nitrogen = $N_2 = 14$

and for the atomic weights—

	H	C	O	N
the values—				
	0.5	6	8	7

which obviously comes to the same as

1	12	16	14
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The law here illustrated was discovered by Avogadro, and formulated by saying that equal volumes of any two perfect gases (at a given temperature and pressure) contain the same number of molecules. This law, in the case of volatile bodies, helps us over all difficulties in selecting amongst the several formulas which mere analysis would admit of as equally good. Supposing $C_nH_2O_7$ to be the unknown formula, the "vapour-density," S, gives us at once the sum-total— $M = C_nH_2O_7$, whence by the analysis the value $a \times C =$ "a," let us call it; whence $a = a \div C$, and so on. The law also enables us to fix the atomic weights of all those elements which form a sufficient variety of volatile compounds; but this practically comes to almost the same as saying that it applies only to O, H, N, C, Cl, Br, I, S, P, and perhaps one or two more. For the rest we should have to rely on purely chemical methods if it were not for the—

Law of Dulong and Petit, which applies to all metals (at least), and may be formulated by saying that supposing A is the atomic weight and S the specific heat, we always have $A \times S =$ an approximately constant value, which lies about 6.4 for $H = 1$. To show the utility of the law as a guide in selecting atomic weights, chemical methods show that the atomic weight of lithium is either 7 or 14 ($H = 1$); but they give no preference to either value. Now the specific heat of the metal is 0.94, whence $Li \times .94 = 6.4$ about; whence approximately $Li = 6.4 \div .94 = 6.8$; obviously $Li = 7$ is the right number.

Mitscherlich's law of isomorphism in regard to our subject holds a similar position to Dulong and Petit's. According to it, bodies of analogous constitution crystallize in the same system—as a rule, liable to exceptions. Iron alum is proved to be $24H_2O + K_2OSO_4 + Fe_2O_3.8SO_2$. Ordinary (aluminium) alum is the same, except that the $Fe_2O_3 = 160$ parts of ferric oxide is replaced by 102 parts of alumina, containing $8 \times O = 48$ parts of oxygen. Yet these 102 of alumina might be Al_2O_3 , where $Al = 1$ atom = 18 parts of metal. But both substances crystallize in

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regular octahedra; hence we conclude that the 102 of oxide = Al_2O_3 , analogous to Fe_2O_3 where $Al = 2$ atoms = 2×27 part of aluminium.

In regard to the special methods which have been used for determining the exact numerical values of the atomic weights, we refer to the articles on the several elements. But our article would not be complete without a table of what we now consider the most probable values of the more important of these units. The one we give is taken from Lothar Meyer's and Seubert's "Atomgewichte der Elemente nach den Originalzahlen neu berechnet, 1883."

		Atomic Weight.	
Name of Element.	Symbol.	Value.	
			O = 16
Aluminium, .	Al	1.804	27.11
Antimony, .	Sb	7.49	119.9
Arsenic, . .	As	4.683	75.09
Barium, . .	Ba	8.575	137.2
Bismuth, . .	Bi	13.0	208
Boron, . .	B	.688	10.9
Bromine, . .	Br	4.997	79.95
Cadmium, . .	Cd	7.00	112
Calcium, . .	Ca	2.501	40.02
Carbon, . .	C	.7502	12.003
Chlorine, . .	Cl	2.2159	35.45
Chromium, .	Cr	3.28	52.5
Cobalt, . .	Co	3.67	58.7
Copper, . .	Cu	3.959	63.54
Fluorine, . .	F	1.194	19.1
Gold, . .	Au	12.29	196.6
Hydrogen, . .	H	.06255	1.002
Iodine, . .	I	7.9284	126.86
Iron, . .	Fe	3.501	55.02
Lead, . .	Pb	12.932	206.9
Lithium, . .	Li	.439	7.02
Magnesium, .	Mg	1.50	24.0
Manganese, .	Mn	3.43	54.9
Mercury, . .	Hg	12.52	200.3
Nickel, . .	Ni	3.67	58.7
Nitrogen, . .	N	.8779	14.046
Oxygen, . .	O	1	16
Phosphorus, .	P	1.940	31.04
Platinum, . .	Pt	12.177	194.8
Potassium, .	K	2.446	39.14
Silver, . .	Ag	6.7456	107.93
Silicon, . .	Si	1.75	28.0
Sodium, . .	Na	1.4408	23.05
Strontium, .	Sr	5.47	87.5
Sulphur, . .	S	2.0037	32.06
Tin, . .	Sn	7.35	117.6
Zinc, . .	Zn	4.065	65.0

The numbers under "O = 16" come practically to the same as if they were referred to $H = 1$. We preferred to calculate them for $O = 16$ (or for $H = 1.002$), because the numbers are far more directly related to the oxygen than to the hydrogen value; and because it brings out better that a good number of our atomic weights are very nearly integer-multiples of that of hydrogen. Many years ago Prout asserted this to be the case with all elements; and although his opinion was founded on utterly insufficient data, it took a firm hold of the chemical mind, and had the good effect of causing a number of excellent researches on the subject. At the present time no chemist could possibly believe in the general correctness of "Prout's law;" but it is and remains remarkable that the law does hold practically for a good number of small and very precisely determined numbers, including the values C, N, O, of the "organic elements;" and one cannot help surmising that these atoms at least, and perhaps also that of sulphur, are merely condensed hydrogen. Of far greater scientific importance is a relation which was pointed out some years ago by Mendeleeff, and by Lothar Meyer, which consists in this, that the general chemical characters of elements are a periodic function of their atomic weights. The following table of L. Meyer's shows clearly what he

between the open area and the walls (*parietes*) of the atrium; thus the *cavum aedium* would be the hollow space open to the sky and ruin, while the atrium would be the covered part, and would therefore form the hall or room of audience. If our conjecture, founded on this obscure passage of Varro descriptive of the parts of a Roman house, be correct, it might be suggested that the *compluvium* meant rather the rim or gutter from which the rain fell than the whole area of the open space over the impluvium.

The atrium was the most important and usually the most splendid apartment of a Roman house. Here the owner received his crowd of morning visitors, who were not admitted to the inner apartments. Originally the atrium was the common room of resort for the whole family—the place of their domestic occupations; and such it probably continued in the humbler ranks of life. In every house, of rich and poor alike, the atrium formed the central place, the “house-place,” where were the *focus* or family fire, the *lares* or household gods, the nuptial couch, and the matron’s spinning-wheel, either for use or for an emblem, according to the rank in life of the proprietor. It was a large apartment, roofed over, but with an opening in the centre, called *compluvium*, as mentioned above, towards which the roof sloped so as to throw the rain water into a cistern in the floor, called *impluvium*, whence it ran off by suitable channels.

The ruin of Herculaneum and Pompeii has preserved to us a large number of private dwellings of every sort, and public buildings; so that, for the trouble of unearthing these buried treasures, we can make ourselves as perfectly acquainted with Roman houses and temples as with our own. The latest, most elaborate, and trustworthy work is the fine treatise on “recent excavations” (Pompeii, “Die Neuesten Ausgrabungen, 1874–81”) by Presuhn, illustrated by sketches taken on the spot by a competent English water colour artist, Miss Amy Butts (published at Leipzig, 1882). The older excavation, are most carefully described in Overbeck’s “Pompeii,” and very fully illustrated (third edition, Leipzig, 1875). In these books we see the entire plan of a Roman house laid bare, and this not from theory or from half-understood writings of ancient authors, but from drawings of buildings actually existent, and which any one may see who is able to make the journey to Italy. Such houses we shall describe fully under POMPEII; here we need only sketch the general plan. The front of the house was often occupied by shops, leaving a vestibule which led into the atrium. Opposite the vestibule the atrium was closed by heavy curtains, answering the purpose of our “folding-doors,” and cutting off the tablinum, while yet allowing it to be made part of the atrium for large receptions. The dining-room (*triclinium*) was to the right, and the library (or such a room)

of the atrium being left free. These could, if needed, serve as reception rooms by means of a curtain or a screen drawn across the entrance. All these rooms received their light from the atrium—that is, from the opening of the *compluvium*, as above explained.

ATRIUM was also the name given to a similarly constructed class of public buildings, differing from the *BANCUCA* in having but three sides, as the Atrium Publicum in the Capitol at Rome, which Livy mentions.

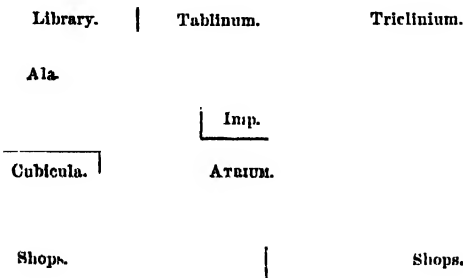
ATROPA, a genus of dicotyledonous plants belonging to the order *SOLANACEÆ*, and consisting for the most part of poisonous species. It is distinguished from other genera of the same order by its regular bell-shaped corolla, its five-parted permanent calyx, which never acquires a bladdery appearance, and by its succulent fruit. The species of most common occurrence is—

Atropa Belladonna (deadly nightshade), which is found not unfrequently in thickets and hedges in this country. The whole plant is of a lightish green colour, except the flowers, which are large and of a dingy brownish-purple, and the berries, which are of a rich deep black. The root is perennial, the stem grows about 2 feet high, and the leaves are acute and oblong, tapering to each end. The flowers are bell-shaped, larger than those of the harebell, and placed singly in the axils of the leaves. The border of the corolla is cut into five equal lobes; there are five stamens, the ovary with two cells, and many seeds, a long slender style, and a flattened stigma slightly divided into two lobes. The odour of the whole plant is nauseous and oppressive. The active property of belladonna, though most commonly remarked in the berries (which, from their resemblance to cherries, have been sometimes eaten by children with fatal effect), exists also in the leaves, and especially in the roots, both of which have the same acrid narcotic property. *Atropa Belladonna* is employed medicinally in the form of dried leaves or of an extract. Its action differs according to the quantity taken. If the dose be small a quickening of the heart’s action follows, and it has a stimulating effect; but if the dose be larger a sedative effect of a very powerful kind ensues. During the first stage excitement of the heart, the brain, and the intellectual faculties is manifest; this is succeeded by greatly diminished sensibility, perhaps most markedly observable in the extreme dilatation of the pupil, and the insensibility of the stomach to the stimulus of emetic substances. The delirium accompanying the action of an overdose of belladonna is always of a gay and elevated kind; a red eruption or efflorescence on the skin is also generally observable. The action of belladonna is due to an alkaloid called atropine, which forms long transparent colourless crystals, insoluble in cold water, and very slightly soluble by boiling water and alcohol.

The cases in which belladonna may be most advantageously employed are diseases of increased sensibility of the nerves, particularly local affections of the nerves, such as the *douloureux* and other pains. It is employed by oculists in the form of solution dropped into the eye, in order to dilate the pupil previous to an operation. It has been recommended as a useful sedative in whooping-cough and in asthma, and has also been employed (externally as well as internally) in cancerous and scrofulous diseases. In case of poisoning by it the stomach pump should be used, and bleeding will occasionally be necessary to relieve the gorged state of the vessels of the head.

ATROPHY (from the Greek word *atrophia*, signifying “want of nourishment,” “wasting”), deficient nutrition either of a part or of the whole of the body. Wasting may of course be produced without disease, by merely withholding the supply of nutritious food; but the term atrophy is always understood to apply to that wasting away which is due to deficient or abnormal work of the bodily organs.

General atrophy will result from failure of the great



to the left of the tablinum, and a passage led by the triclinium to the private apartments, peristyle, and garden behind. Bed-rooms (*cubicula*) were on each side of the atrium, but not quite extending all along, the “wings” (αἶψ)

digestive organs, of the respiratory organs, or of the nervous system. Local atrophy may occur when the failure is limited to one organ, and is not absolute.

A cessation of function, from whatever cause, is manifestly and invariably followed by wasting of the organ in which the function had its seat. The gland that does not secrete diminishes in bulk; the nerve that does not receive and transmit impressions or convey its wonted stimulus wastes; and the muscle that does not contract dwindles away, while increased exercise contributes exceedingly to the augmentation of its volume, as we see in the bulk of the blacksmith's arm and in the leg of the ballet-dancer. From the complete and long-continued cessation of action the substance of organs is sometimes almost entirely removed, nothing remaining by which its original structure can be distinguished.

There is, however, a form of atrophy which is now recognized as a specific disease, and is known as the "wasting palsy," or progressive muscular atrophy. In this disease the first symptoms generally noticed are sensations of weakness in the muscles affected, sometimes attended by numbness and tingling and occasional twitchings, together with a marked decrease in their size. In most cases the upper limbs are first affected, the right hand being the first to suffer; but when the disease has continued for any length of time the muscles of the legs become affected, to be followed in their turn by those of the body. Though sometimes hereditary, it is more frequently brought on by excessive exertion, exposure to cold and wet, and by injuries to the spine. The process of this disease was unknown until within a recent period, but it is now known to arise from a diseased state of the anterior roots of the nerves of the spinal cord. When brought about by excessive exertion it may frequently be cured, and sometimes the disease, after destroying a set of muscles, will cease of itself; but in many cases it refuses to yield to any mode of treatment, and ends fatally.

ATRYPA (Gr. *a*, not; *trupa*, hole) is an extinct fossil genus of BRACHYORONA, allied to the lamp-shell (Terebratula). This mollusc had a very wide range, species being found extensively in beds of the Silurian and Devonian formations. The beak of the ventral valve was perforated by an aperture, and through this passed the stalk by which the animal attached itself to a rock or other foreign body. This aperture, however, is so hidden by the curving of the beak that the name *Atrypa* (signifying "without an aperture") was inadvertently given to this genus. The best known species is the *Atrypa reticularis*, which extends from the Upper Silurian beds to those of the Middle Devonian series.

ATTACCA (Ital. "to cleave to"), in music, denotes that the next movement is to follow immediately, without any pause; as the movements of the well-known "Scottish symphony" by Mendelssohn. In the language of the old contrapuntists, *attacca* signifies a short irregular fugal or imitative subject, not liable to the severe laws of fugue.

ATTACHÉ (French), one attached to another as assistant. The term is generally used to describe a young diplomatist who accompanies an embassy to assist the ambassador, and to gain an insight into the methods of conducting political business. Attachés in the English diplomatic service receive no salary as such, but may often have small allowances for special knowledge of public law or for proficiency in foreign languages. From attachés they are promoted to be third secretaries, then second secretaries, and secretaries of legation.

ATTACHMENT. An attachment is a kind of criminal process which courts of record are authorized to issue. This process is granted in cases of contempts, which all courts of record may punish in a summary manner. If a contempt be done in the presence of the court, by a breach of the peace, defiance of its authority, or an interruption of its

proceedings, the offender may at once be attached and committed, and afterwards punished to a reasonable extent at the discretion of the presiding judges. On the other hand, if it be suggested by a person upon oath that one not present in court has committed an action which amounts to a contempt, the court will make a rule upon the offender to show cause why an attachment should not issue against him. Attachments are now chiefly employed in cases of constructive contempts, such as abuses of the administration of justice by judges of inferior jurisdiction, for corruption or injustice by officers and ministers of the courts in refusing to execute lawful process, for doing it oppressively or corruptly, or for making false returns. Attorneys, who are officers of the different courts in which they are admitted, may be punished by this summary mode of proceeding for any dishonest practice. Jurors also may be liable to attachment for making default when lawfully summoned, for refusing to be sworn or to give any verdict, or for receiving a bribe or instructions from either of the parties in a suit to be tried by them. Wilful perjury in the presence of the court, disrespectful words or conduct to the presiding judge, the counterfeiting of writs, the refusing to pay money or perform acts according to the direction of an award entered into by rule of court, the non-payment of costs taxed by the officer of the court in which a proceeding is pending, are contempts which subject the persons who commit them to the summary process of attachment. The Court of Chancery will issue attachment upon the refusal to obey an injunction or order of the court.

ATTACHMENT, FOREIGN, is a proceeding by means of which a creditor may obtain the security of the goods or other personal property of his debtor, in the hands of a third person, for the purpose, in the first instance, of enforcing the appearance of the debtor to answer to an action; and afterwards, upon his continued default, of obtaining the goods or property in satisfaction of the demand. The process in England was founded entirely upon local customs, and was an exception to the general law. It existed in London, Bristol, Exeter, Lancaster, and some other towns in England, and was much more commonly resorted to in the lord mayor's court of London than in any other local courts.

A difference of opinion prevails with respect to the utility of this proceeding. On the one side, it is said to be particularly advantageous in a city much frequented by foreigners for the purpose of trade, who may contract debts during their abode in England, and then remove themselves to foreign parts, beyond the reach of personal process; on the other hand, it is supposed to embarrass commercial operations in consequence of the enormous power which it places in the hands of creditors—a creditor for £20 being entitled, if he pleases, to attach property to the amount of £20,000, or any larger sum, which cannot be applied in discharge of any commercial engagements which the debtor may have formed, until the attachment is disposed of. It does not, however, appear to be likely that the existence of this custom should, under ordinary circumstances, have the effect of deterring the fair merchant from sending his goods to London; though it may well happen that a trader, who has contracted debts in London which he does not intend to pay, would hesitate to send a cargo to a port where, by means of this process, his creditors in that place might instantly seize it. Nor can much practical inconvenience arise from the power of attaching a large property for a small debt; for the garnishee (that is, the person who holds the property of the debtor), who is generally the agent of the defendant, may dissolve the attachment, by appearing for the defendant and putting in bail to the action; or, if satisfied of the truth of the debt upon which the attachment issues, he may pay the plaintiff's demand, and take credit for the amount in his account with the defendant.

Under the Common Law Procedure Act, 1854, there is now a proceeding for all parts of the country analogous

to that in the lord mayor's court; but no order for the attachment of the wages of any servant, labourer, or workman can be made by the judge of any court of record or inferior court.

ATTACK, in military language, signifies an advance upon an enemy with a view of dislodging him from his position and dispersing or destroying his forces, and is used both for engagements on the battle field and attacks upon fortified positions. In open country it may be conducted either by cavalry or infantry, or by a combination of all the forces at the disposal of the commander. As a general rule an attack is directed against one of the flanks of the enemy, as it is well known that the best troops lose confidence when their flank is turned, while with undisciplined and irregular forces the turning of a flank and the appearance of an enemy in the rear almost invariably causes a stampede. Napoleon, however, preferred attacking an enemy's centre by means of heavy columns; and this when successful enabled him to throw his whole force against one half of that of the enemy, and involve it in rout before it could receive support. In modern times an attack is generally commenced by the artillery, which from a distance rains shells upon the enemy's position, endeavouring to silence his guns and create confusion in his ranks, so as to facilitate an attack by the other forces. Under cover of the artillery fire skirmishers are thrown out, who by their fire still further annoy the enemy, and serve to cover the movements of the attacking columns by whom the assault is delivered. Some positions are best attacked by cavalry, and a brilliant cavalry charge has often been the turning-point of an obstinate conflict; but the power of the modern breech-loader will probably render this less frequent in the future. These weapons confer considerable advantage upon troops acting on the defensive when protected by rifle-pits or trenches, but it is also found that the power of maintaining a heavy fire while advancing serves to encourage those who are advancing upon an enemy. For the mode of attack upon fortifications see **ASSAULT**.

ATTAINER (from the Latin word *attineus*, attain, stained) was a consequence which the law of England formerly attached to the passing of sentence of death upon a criminal. It did not follow upon mere conviction of a capital offence; but as soon as sentence of death was passed, or a judgment of outlawry given in the case of capital treasons or capital felonies, when the person accused had fled from justice, which was equivalent to sentence of death, the prisoner became legally *attainted*. He lost all power over his property, and became incapable of performing any of the duties or enjoying any of the privileges of a freeman.

The principal consequences of attainder were forfeiture of the attainted person's real and personal estates, and what was called corruption of his blood. The forfeiture of the personal estate dated from the time of his conviction, and included everything which the criminal was then in his own right entitled to legally or beneficially. Real estate was not forfeited until attainder; but the forfeiture (except in the case of attainder upon outlawry) had relation to the time when the offence was committed, so as to avoid all intermediate sales and encumbrances ("Co. Litt." 390 b.) Attainder for treason was followed by forfeiture to the crown of all freehold estates, whether of inheritance or otherwise, of which the person attainted was seized, or to which he was entitled at the time of the treason committed or afterwards. Copyholds were forfeited to the lord of the manor upon the attainder of the tenant. Lands held in gavelkind were forfeited on attainder for high treason, but they were not subject to escheat for felony (Robinson, "Gavelkind," 2261). By 5 & 6 Edw. IV. c. 11, the dower of the widow of a person attainted for treason was also forfeited.

In cases of attainder for murder the forfeiture of freehold lands in fee-simple to the crown was for a year and a

day, with an unlimited power of committing waste upon the lands during that period, which is called in our old law-books "the king's year, day, and waste." After the expiration of this term the lands became escheat to the lord of whom they were holden; because by this attainder of a tenant in fee-simple his blood was corrupted, and he was disabled from inheriting lands himself or transmitting them to his descendants. The legal consequence of this doctrine was an escheat to the lord. See **ESCHEAT**.

It has been usual, where a new felony has been created by Act of Parliament, to make an express provision that it shall not extend to corruption of blood. By 54 Geo. III. c. 145, corruption of blood was taken away for attainder, except in cases of treason, petit-treason, and murders. By the Act 3 & 4 Will. IV. c. 106, which relates to descent, it is enacted (s. 10), "That when the person from whom the descent of any land is to be traced shall have had any relation who, having been attainted, shall have died before such descent shall have taken place, then such attainer shall not prevent any person from inheriting such land who would have been capable of inheriting the same, by tracing his descent through such relation, if he had not been attainted, unless such land shall have escheated before the first day of January, 1834." A further alteration was made, by the 6 & 7 Vict. c. 85, which allowed an attainted person to give evidence in a court of justice, and the whole law on this subject was fully revised by the Act 33 & 34 Vict. c. 23. By this Act it was enacted that no conviction for treason or felony, and no verdict of *felo-de-se*, should henceforth cause any attainer, corruption of blood, forfeiture, or escheat. But any person convicted of treason or felony, and sentenced to any punishment more severe than imprisonment for twelve months with hard labour is disqualified from holding a seat in Parliament, voting at elections, is rendered incapable of holding any public office or receiving any public pension, and he cannot sue for any property, debt, or damage. By this Act also it was provided that during the time he is undergoing his term of imprisonment the crown may appoint administrators to take charge of his property; and if the crown does not appoint an administrator, interim curators may be appointed by justices of the peace. Such officers are paid at the expense of the convict, have full power to deal with the property so as to meet the debts incurred by the convict, or to compensate those he has injured by his fraud or criminality. They may also undertake the support of his family, and make suitable allowances for this purpose out of the property in their hands, and they must render a proper account, and hand over any surplus to the convict himself when he is pardoned or has served his term of imprisonment.

There have been frequent instances in the history of England of attainders by express legislative enactment, called "bills of attainder."

These enactments, either in the shape of bills of attainder or bills of pains and penalties, have been made at intervals from an early period of our history down to very recent times. They have generally occurred in times of turbulence or of arbitrary government; but the number of them is sufficiently large to form a formidable list of precedents. It was not till the reign of Henry VIII. that the proceeding by bill of attainder became so common as almost to supersede trials according to the ordinary process of law. Scarcely a year passed without persons of the highest rank being brought to the scaffold by bill of attainder. Among them were the Earl of Surrey, Thomas Cromwell (who is said to have been the adviser of these measures), and most of those persons who suffered for denying the king's supremacy. All these persons were attainted upon mere hearsay evidence; and some not only without legal evidence, but without even being heard in their defence. Under the Stuarts recourse was seldom had to this extraordinary mode of proceeding.

It was again adopted by the Long Parliament in Lord Strafford's case, on the ground that he was an extraordinary criminal, who would have escaped with little punishment if no other penalties than those of the existing laws had been inflicted on him. But even Lord Strafford's attainder was reversed after the restoration of Charles II., and all the records of the proceedings cancelled by Act of Parliament. A remarkable instance of a proceeding by bill of attainder occurred in the case of Sir John Fenwick, who, in the year 1696, was attainted for a conspiracy to assassinate William III. Sir John Fenwick might have been tried by the ordinary process of law; but the excuse for resorting to a bill of attainder was, that there was no moral doubt of Fenwick's guilt; but that as two witnesses were required by the statute 7 Will. III. c. 3, in order to convict him, and as one of them had been removed out of the kingdom, a legal proof of an overt act of treason became impossible. The effect of this bill of attainder was to suspend the statute of 7 Will. III. c. 3, in order to destroy an individual. This exertion of legislative power did not take place without a strong opposition. Bishop Burnet, one of its most strenuous supporters, allowed that "this extreme way of proceeding was to be put in practice but seldom, and upon great occasions" (Howell's "State Trials").

Since the accession of the house of Hanover there have been few bills of attainder or bills of pains and penalties. Bishop Atterbury was deprived of all his offices and emoluments, declared incapable of holding any for the future, and banished for ever, by a bill of pains and penalties, which received the assent of George I. on the 27th of May, 1723. He was charged with carrying on a traitorous correspondence in order to raise an insurrection in the kingdom and procure foreign power to invade it. It was by a bill of pains and penalties that proceedings were taken against Queen Caroline, the wife of George IV., in 1820.

The proceedings in Parliament, in passing bills of attainder and of pains and penalties, do not vary from those adopted in regard to other bills. They may be introduced into either house. The parties who are subjected to these proceedings are admitted to defend themselves by counsel and witnesses. Bills for reversing attainders are "first signed by the king, and are presented by a lord to the House of Peers by command of the crown."

ATTAINT, a writ which formerly lay to inquire whether a jury had given a false verdict. It at first lay only on the trial of writs of assize, and is said to have been introduced by Henry II. at the instance of Chief-justice Glauville. It was afterwards extended to all pleas except writs of right, where the issue was joined on the *mere right*.

If the jury on the attaint, who were twenty-four in number, found that the verdict was false, the judgment against the jury who found the false verdict was very severe. But more moderate judgment was introduced by 11 Henry VII. c. 24, made perpetual by 13 Eliz. c. 25.

So ineffectual, however, was this proceeding, that it gave place, in the time of Elizabeth and James I., to the now existing practice of setting aside verdicts on motion and granting new trials. By the 6 Geo. IV. c. 50 (consolidating the laws relating to juries), the proceeding was abolished, but it was provided, by sec. 61, that any person guilty of *embrocery* (corruptly influencing a juror by promises of money) may be proceeded against, and punished as before.

ATTALEA, a genus of PALMS, found chiefly in the tropical parts of South America, where it occupies the richest soil and the hottest forests, rarely ascending the sides of mountains, or spreading from the woods into the open country. It extends, according to Martius, as far south as the tropic of Capricorn. It belongs to the same division of the order as the cocoa-nut, from which, as well as from all its immediate allies, except *Arenga*, it is distinguished by its nut containing three cells and three seeds.

Attalea funifera, called by the natives *Piaçaba*, is found in the native forests of the maritime provinces of Brazil. The best cordage in America, for naval purposes, is manufactured from the fibres of the leaf-stalks and other parts. Such ropes are of great strength, and are extremely durable in salt water. No other cables are employed in a great part of the Brazilian navy. The fibre is also used for making brooms for sweeping the streets. This species does not grow more than from 20 to 30 feet high. Its nuts, which are about as large as an ostrich's egg, have a hard shell like that of the cocoa-nut, and are used for turnery work, such as making handles for bells and umbrellas.

Attalea compta, another species, is equally useful, but for different purposes. This plant, the *pindora* of the old writers on Brazil, and the *induja* of the modern Portuguese, forms delightful groves in the interior of the country, growing from 20 to 50 feet clear of its branch-like leaves. The latter are from 15 to 20 feet long, and about 3 feet wide. The fruit is the size of a goose's egg, and contains an eatable kernel, of which the negroes are fond. Its leaves form an excellent thatch, and are woven into hats, mats, and baskets.

Attalea speciosa is the plant which, in the provinces of Maranhao and Para, furnishes the nuts which the Brazilians burn for the purpose of smoking the juice of *Siphonia elastica*, or india-rubber, until it becomes black.

ATTALUS, a senator of Rome under the reign of Honorius, was sent by the Romans to that emperor at Ravenna to represent to him the difficult situation of the capital, threatened at that time by ALARIC, and to advise him to fulfil the conditions of a treaty which had been concluded with that Gothic chief through Attalus; but Honorius refused, and Alaric laid siege to Rome. Attalus, who was then prefect of Rome, was proclaimed emperor by Alaric, who required the Romans to swear allegiance to him, A.D. 409. Attalus then went with an army of Romans and Goths to besiege Honorius in Ravenna. Honorius proposed to associate him in the empire, but Attalus refused to listen to the proposals, thinking himself possessed already of the real power. However, having opposed Alaric in some of his views, he was immediately deposed by the Gothic chief. (Gibbon, "Decline and Fall.")

ATTALUS I., king of a small but wealthy and populous country in the north-western part of Asia Minor, of which Pergamus was the capital. The name of Asia was specially applied by the Romans to this country. Attalus was the son of Attalus, youngest brother of Philoetarus; and cousin to Kumenes I., whom he succeeded B.C. 241.

Attalus assumed the regal title after a victory over the Gauls, who had taken possession of that part of the country called after them Galatia. When the Rhodians and Byzantines were preparing to make war on each other, in consequence of the Byzantines having imposed a tax on all vessels entering the Euxine (about 221 B.C.), Attalus espoused the cause of the Byzantines. He was also at war with Achæus, the governor under Antiochus III. of all Asia west of Mount Taurus; and having taken into pay a body of the Gauls called Tectosages, he recovered many of the cities of Æolis, which had submitted to Achæus. In the midst of his victorious career an eclipse of the moon (B.C. 218) happened, which so alarmed the superstitious Gauls that they left him (Polyb. v. 77, 78). In B.C. 214 he was in alliance with Antiochus the Great, king of Syria, who was equally anxious with himself to get rid of Achæus, now in full revolt; and whom they defeated at Sardis, and murdered afterwards. About B.C. 208, Attalus joined the Ætolians against Philip, king of Macedonia, and he was appointed joint-prætor of the Ætolians with their general Pyrrhus. In the course of the war Philip besieged Attalus in Pergamus, but without being able to take the city. Philip having retired, Attalus passed over to Athens (B.C. 200), where he was received with great honour, and

renewed his alliance with that people. He joined the Romans with a considerable body of troops, and the confederates captured Oreuna, a strong city of Eubœa. Attalus continued to assist the Romans against Philip, and (u.c. 197) he appeared in the assembly of the Bœotians, with a view of detaching them from the cause of Philip. In the midst of an eloquent harangue he was seized with apoplexy; and though he lingered long enough to be conveyed to Pergamus he died within a few weeks, in the seventy-first year of his age, having reigned forty-four years. He left, by his wife Apollonis, four sons, of whom Eumenes succeeded him, and Attalus succeeded his brother Eumenes.

ATTALUS II., named Philadelphus, from his fondness for his brother, was the second son of Attalus I., and succeeded to the throne of Pergamus on the death of his brother Eumenes II. (u.c. 159). He pursued the policy of his family in maintaining an intimate alliance with the Romans.

ATTALUS III., named Philometer, from his affection towards his mother, was the son of Eumenes II. He succeeded (u.c. 138) to the throne of Pergamus on the death of his uncle, Attalus II. His reign was made memorable by his extravagancies and crimes. He was guilty of the murder of many friends and relations. He finally gave up all care of public business, and devoted his time to gardening, with which he became so well acquainted that he wrote a work on the subject, which is recommended by Pliny (xviii. 4) and others. He died u.c. 133, and by his will bequeathed his property (bona) to the Romans. The kingdom was claimed by Aristonicus, an illegitimate son of Eumenes II., who was finally taken prisoner to Rome, and strangled in prison, u.c. 129. The kingdom of Pergamus was from this time the Roman province of Asia. (Clinton's "Fasti Hellenici," vol. ii.)

ATTAR or **OTTO OF ROSES** is a powerful perfume prepared by distilling the petals of roses. *Rosa centifolia* (the cabbage rose) has been generally considered the source of attar, but Mr. J. G. Baker, of Kew, states that the rose grown on the slopes of the Balkans for distillation is *Rosa damascena*. Attar is made in India, the south of France, and Tunis, but the whole amount is consumed in those countries. The attar of commerce comes almost entirely from the country round Kizanlik, in Roumelia. The average amount exported from this district every year is as much as 4000 lbs. avoirdupois, the value of which is about £60,000. The war between Russia and Turkey in 1877-78 interfered with the trade, but it soon recovered itself. The method employed in Roumelia, according to Baur, is as follows:—The roses are collected before sunrise, and distilled the same day. They are placed with a double volume of water in a tinned copper still, and to this a tube of tin is attached, passing through a tub supplied with running water. The heat applied to the still is that of an ordinary fire for about an hour and a half. The product of distillation is collected in a flask, and kept for a day or two at a temperature of at least 60°. The oil then separates and is skimmed off. Attar consists of two essential oils, one of which is scentless. In countries where the summer heat is less than in Kizanlik the scentless oil exists in the roses in a much larger proportion than the other, and consequently the attar is of not much value.

ATTERBURY, FRANCIS, was born 6th March 1662, at Milton, near Newport Pagnel, Buckinghamshire. He was educated at Westminster, and elected student of Christ Church, Oxford, in 1680. His talents for the pulpit having soon become conspicuous, he was speedily appointed one of the royal chaplains-in-ordinary.

In 1698, while tutor to the Hon. Mr. Boyle (afterwards Lord Orrery), he assisted that gentleman in the preparation of an edition of the "Epistles of Phalaris," in the preface of which an attack was made upon Dr. Bentley. Bentley replied by a short paper, in which he showed that the Epistles themselves were spurious, and

that the editor was unequal to his task. The controversy attracted much attention among scholars and men of letters, and a reply to Bentley, entitled an "Examination of Dr. Bentley's Dissertations on the Epistles of Phalaris," was published in the name of Boyle, but was really the work of Atterbury. It displayed a keen wit and much ingenuity of argument, but neither tutor nor pupil was in any way a match for Bentley in critical scholarship.

In the year 1700 Atterbury engaged in a long controversy with Dr. Wake (afterwards Archbishop of Canterbury) and others concerning the rights, powers, and privileges of Convocation. His zeal for the interests of his order procured him the thanks of the Lower House of Convocation, and the degree of Doctor in Divinity, without keeping an act or paying fees, from the University of Oxford.

In 1704 Atterbury was advanced to the deanery of Carlisle. In 1712 he was made Dean of Christ Church, Oxford. Owing to his imperious temper the flames of discord soon broke out in the college, and his removal was thought necessary for the restoration of peace. In 1713, on Lord Oxford's recommendation, he was promoted to the bishopric of Rochester, and the deanery of Westminster. With the death of Anne his hopes of further advancement fell to the ground. He attempted to gain the good graces of George I., but his overtures were rejected with marks of personal dislike. Atterbury commenced hostilities by refusing to sign the bishops' declaration of fidelity, during the rebellion of 1715. In the House of Lords, Atterbury drew up some of the most violent protests against the measures of the court and ministry. The report of a secret committee of the House of Commons charged him with a treasonable correspondence, for the purpose of raising an insurrection in the kingdom and procuring invasion from abroad. The evidence against him was considered to justify his apprehension and commitment to the Tower, in August, 1722. In the course of the ensuing March a bill of pains and penalties against him was brought into the House of Commons. The penalty contained in the bill was, that he should be deprived of all his ecclesiastical offices, and for ever incapacitated from holding any civil employment within the king's dominions, or discharging any spiritual functions; that he should suffer perpetual exile, and if found within the realm after a certain day should be treated as a felon, and excluded from the benefit of the royal prerogative of pardon. His speech in his own defence was both argumentative and eloquent; his demeanour was firm and collected. After a long and warm debate, the bill was passed by a majority of 83 to 43. The dispassionate view of the case seems to be, that the bishop was really guilty of the political offence laid to his charge, but that proofs neither sufficiently strong nor strictly legal could be adduced, and that the mode of procedure was in its nature dangerous and unconstitutional. ("Historical Register," and "Debates of the House of Lords.")

In June, 1723, the bishop quitted England. He settled at Paris, where he resided till his death, softening the severity of his banishment by study, conversation, and correspondence with learned men. He died at Paris on the 15th of February, 1731, and was privately buried in Westminster Abbey. In 1768 a correspondence which took place between the bishop and his friends in 1725 was published in Edinburgh, the authenticity of which has never been questioned. From these letters it is evident that he was deeply implicated in the abortive schemes for raising another rebellion in the Highlands of Scotland.

The philosophical calmness displayed by Atterbury in his letters to his friends seems altogether inconsistent with the headlong turbulence of his party zeal, and probably was assumed to cover an infirmity of which he was conscious. A striking instance of the bishop's Jacobitism is to be found in Dr. Birch's manuscript papers. "Lord Harcourt declared that on the queen's death the bishop came to him

and Bolingbroke, and said nothing remained but to proclaim King James. He further offered, if they would give him a guard, to put on his lawn sleeves and head the procession." (Monk's "Life of Bentley," ii. 257.)

His fame rests on his sermons, which are both argumentative and unaffectedly eloquent; and on his epistolary correspondence with Pope, in which his letters are distinguished for ease and elegance.

ATTESTATION, a term used in conveyancing for the verification of deeds and wills by witnesses. The clause at the end of these, immediately before the signatures, is in English law practice named the Attestation Clause, in Scotch practice the Testing Clause.

ATTIC, the upper room or rooms of a house, with or without a parapet-wall in front. Possibly the parapet-wall, which corresponds with the attic-wall in architecture, may have given the name to such room or rooms.

ATTIC is a term in architecture, comprehending the whole of a plain or decorated parapet-wall which terminates the upper part of the façade of an edifice. The derivation of the word is uncertain. It appears to have been a generally received opinion that the word was derived from the circumstance of edifices in Attica being built after this manner. There is at Athens a monument—that of Thrasylus—with an attic over the order of pilasters which form the basement. In the centre there was a colossal statue. This example may be taken as that of the best type of a Greek attic which is at present known. Another example, which bears a closer resemblance to the Roman attic, exists in the upper wall of the nave of the Temple of Zeus Olympius at Agriguntum, where there is an entire wall with short pilasters at intervals, in the front of which are figures placed above the pilasters of the nave.

Below we give a representation of a Roman attic, the only remaining part of a superbly decorated wall inclosing

usually employed an attic in their designs, as may be seen by a reference to their works, and more especially to the designs of Palladio, entitled "Le Fabbriche e i Disegni di Andrea Palladio raccolti ed illustrati da Ottavio Bertotti Scamozzi" (1776). The attic is in such common use that there are few public buildings in London without it. Somerset House, in the view towards the street, may be taken as offering a very fine example of this feature of an edifice. Opinions differ as to the attic. Some consider it a deformity, and at least only to be tolerated where it is unavoidable. They would accordingly confine it nearly altogether to domestic architecture.

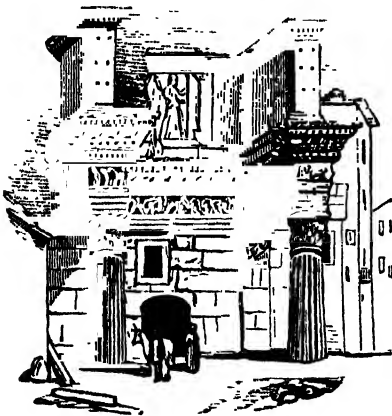
ATTIC DIALECT, a term applied to designate one of the varieties of the ancient Greek language. A close connection and relationship existed between the old inhabitants of Attica and the Ionians; and the Ionic form of the Greek language, or the Ionic dialect, "was the same as the old Attic, for the ancient Athenians were called Ionians" (Strabo). But in course of time the language of Athens acquired a distinct character and a decided pre-eminence, owing to the excellent works which were written in it on almost every branch of literature. Most of the great works of antiquity which have been transmitted to our times are written in the Attic dialect. Some writers have made two and some three divisions of the Attic dialect, with reference to extant writers; but the general division of the Attic dialect into *old* and *new* seems to be sufficiently exact. To the old belong Æschylus, Sophocles, Euripides, Aristophanes, Antiphon, and Thucydides; to the new Demosthenes, Æschines, and the contemporary orators. The language of Xenophon, Plato, and indeed Aristophanes also, may be considered as possessing a character somewhat intermediate between the two classes, and the name of *middle* may consequently be given to it; but it would be difficult to say exactly how a writer of this middle class is to be distinguished from the writers of the *new* Attic.

After the time of Alexander the superiority of Athenian literature made the language of Athens the common language of those who wrote pure Greek. Aristotle may be considered as the earliest extant writer, not an Athenian by birth, who adopted the language of Athens. The Attic dialect, then somewhat modified under Macedonian influence and by local circumstances, became the common written language of the educated Greeks. This common language of the learned Greeks was called the common dialect (*ἡ κοινή* or *ἡ ἑλληνικὴ διαλεκτός*). Polybius, a native of the Peloponnese, Strabo of Asia Minor, Diodorus of Sicily, and others, belong to the writers who use the common dialect. Some late writers affected rather to imitate the pure old Attic standard than to use the modified Attic or common dialect, as Lucian, Arrian in his "Anabasis," Aristides, and others.

ATTICA, the most famous of the political divisions of ancient Greece. It has the form of a triangle, two sides of which are washed by the sea, and the third is protected by mountains of the Cithæron and Parnes chains. The coast is broken up into numerous small bights and harbours, which are, with few exceptions, exposed to the south wind. The natural divisions of the country are the Eleusian and Athenian plains, the highlands, and the midland and sea-coast districts. The principal hills are Cithæron, Parnes, Hymettus, famous for its bees and honey; Penteliceus, for its marble; and Laurium, for its silver mines.

Attica is a dry country, and the soil requires irrigation. Two small streams water the Eleusian plain; one of them, the Cephissus, though almost dry in the warm weather, brings down from Cithæron a prodigious quantity of water in the wet season, and in ancient times mounds were raised to protect Eleusis from those sudden inundations.

The chief river of the Athenian plain is the Cephissus. The main branch of the Ilissus rises on the north face of the greater Hymettus, from which it takes a turn to the



the Forum of Nerva at Rome. This wall was of considerable extent, and was divided at intervals by columns projecting from the wall, over which the attic wall is continued at right angles to the wall forming the inclosure. The attic is also a conspicuous feature in all the triumphal arches at Rome, and a necessary one. It was not merely intended as a frame-work for the inscription, nor as a support for statues, but is essential to the proportions of the composition. In all the best examples, and especially in the remains of antiquity at Rome, the attic is decorated with a moulded base and cornice, often with pilasters and figures, as in the arch of Constantine.

The Italian architects who had studied the remains of antiquity in Rome, and those who followed in their school,

west and then to the south, running along the east side of Athens. In summer the Ilissus is quite dry in the neighbourhood of Athens.

The range of Parnes stands like a wall between Attica and Bœotia, but the ascent is much greater from the Athenian side. There are several passes through this range, which were formerly of great importance for the military defence of Attica. The soil of Attica is light and thin, and requires very careful cultivation. The chief products are olives, figs, and grapes, and also most kinds of vegetables. The country does not produce much grain. The fineness of the climate has always been celebrated, and the fineness of the Athenian intellect was attributed to the clearness of the Attic atmosphere. Euripides, in a well-known passage, refers to the inhabitants of Athens and its neighbourhood as "ever walking gracefully through the most luminous ether."

In mediæval and modern times Attica has chiefly followed the fortunes of ATHENS, and there has been a large immigration of Albanians, who now occupy a great part of the country. There are still many important classical ruins in various parts—notably those of the temple of Athena at Sunium, which form a conspicuous object.

The village population of Attica, as well as of some other parts and islands of Greece, is almost exclusively Albanian, and the Tosk dialect of the Albanian language may be heard any day in the outlying districts, and even in the market place of Athens itself. But the progress of education is so rapid, and the superiority of the modern Greek language as a vehicle of expression so marked, that the whole of this Albanian population is fast becoming Hellenized.

ATTICUS, T. POMPONIUS, was descended from an ancient equestrian family. He was born 109 B.C. He is sometimes called Q. Cæcilius (Cic. "Ad Att." iii. 20), a name which he derived, 58 B.C., from his maternal uncle Cæcilius, who left him a considerable estate.

His early years were spent under the direction of his father, whose taste for literature induced him to give his son a good education. Atticus lived during the most stormy period of Roman history, but by careful avoidance of politics he contrived to retain the friendship of men of opposite parties. He was on good terms with C. Julius Cæsar, Cn. Pompeius, M. Brutus, M. Antonius, and Cæsar Octavianus, afterwards the Emperor Augustus; but his most intimate friend was Cicero, with whom he kept up a constant correspondence. Pomponia, the sister of Atticus, was married to Cicero's brother Quintus. We still possess the letters of Cicero to Atticus, in sixteen books, one of the most valuable records of that important period, but there is not a single letter of Atticus to Cicero extant. Atticus spent a considerable portion of his life at Athens (from 85 to 65 B.C.), and in fact derived the name of Atticus from his residence in this city and his accurate knowledge of Greek. He returned to Rome B.C. 65, the same year in which Horace was born. His daughter Pomponia married Agrippa, the friend of Augustus.

Atticus died at the age of seventy-seven, 31st March, B.C. 32, of voluntary starvation, after he found that he had an incurable disease. He was celebrated for his critical taste, and was himself the author of several works, none of which have been preserved. He wrote *Annals*, in which he observed a strict chronological arrangement. He was particularly happy in the composition of short epigrammatic inscriptions to be placed under the busts of illustrious men. He wrote also a "History of the Consulate of Cicero" in the Greek language, in a plain unadorned style (Cic. "Ad Att." ii. 1). Atticus was an active man in looking after his own affairs, although in opinions he inclined to the Epicureans. His equestrian rank enabled him to hold a share in one or more of those lucrative

societies which farmed the public revenues. He had a great number of slaves, who were well educated, and served him as amanuenses and transcribers of books. The "Life of Atticus" in Cornelius Nepos is a flattering portrait; but it is apparently a genuine work, and is of a superior character to the other lives attributed to Nepos.

ATTILA, ETHEL, ETHELE, or ATALIK, King of the Huns, was born about the beginning of the fifth century. He was the son of Mundzuk, a Hun of royal blood, and nephew of Roas, king of the Huns, whom he succeeded in 434 A.D., his brother Bleda sharing the throne with him. They reigned over nearly all the tribes north of the Danube and Euxine, their dominions extending from the frontiers of Gaul to the borders of China. By his subjects he was held in superstitious veneration, and was believed to possess the iron sword of the Scythian god of war, which rendered him invincible. The first act of the reign of the brothers was to conclude a peace with the Emperor Theodosius II. in terms disgraceful to the majesty of the Roman empire; but in 447 they ravaged the whole of the countries lying between the Black Sea and the Adriatic. Seventy cities were destroyed, and Constantinople itself was only saved by the strength of its fortifications. Theodosius, after unsuccessfully attempting to murder Attila, was compelled to come to terms, ceding a tract along the banks of the Danube to the breadth of fifteen days' journey, and promising to pay an increased tribute. Attila soon after procured the assassination of his brother Bleda, and henceforward reigned alone. He soon gained the name of "the scourge of God," so great was the terror he inspired.

In 448 the historian Priscus accompanied the Roman ambassadors sent to apologize to Attila for the non-fulfilment of some articles of this treaty, and we derive from him some account of the domestic manners of the Huns. In the plains of Upper Hungary, somewhere between the Danube, the Theiss, and the Carpathian Mountains, they came to a large village, which had grown up about the palace of Attila. They found the King of the Huns living in a style of barbarous splendour in a house constructed only of wood. They were received at a sumptuous entertainment, at which the guests were served in silver and gold; but a dish of plain meat on a wooden trencher was set before the king, of which he partook very sparingly. His beverage was equally simple and frugal. A secret agent in this embassy was charged with the disgraceful task of procuring the assassination of this formidable enemy. Attila was acquainted with the real object of the mission; but he dismissed the culprit as well as his innocent companions uninjured. The Emperor Theodosius was compelled to atone for his base attempt by a second embassy, loaded with magnificent presents, which the King of the Huns was prevailed on to accept. Theodosius died not long after (450), and was succeeded by the more virtuous and able Marcian.

Attila at this time was collecting an enormous army, and threatened both divisions of the Roman world. He demanded of Marcian the arrears of tribute due from the late Emperor Theodosius. Marcian's reply was, "I have gold for my friends and steel for my enemies." Attila determined to make war first on Valentinian, the emperor of the West. Attila wished for a pretext to enter Gaul, and he closed with a proposal from the son of Genseric, king of the Vandals, to attack Theodoric, king of the West Goths. He began by craft what was to be carried on by violence and terror. Valentinian was assured that his warlike preparations were levelled against Theodoric only. Attila crossed the Rhine and committed frightful ravages in Gaul; but his progress was arrested by the combined armies of the Romans and Goths, under the command of Aetius and Theodoric. They compelled him to make a hasty retreat from the siege of Orleans, and came up with

him in the extensive plains surrounding Châlons-sur-Marne. There one of the most bloody battles recorded in history was fought, in which Theodorie was slain. One wing of the allied armies was driven back to its camp, and the other wing was so discouraged by the loss of its leader that the Huns felt certain of victory; but the desperate bravery of Thorismund, the son of Theodorie, changed the fortunes of the day. At the head of the West Goths he led a furious charge, which drove the Huns in wild rout back to their camp. The next day Attila remained on the defensive, and prepared to burn all his waggons, wooden shields, and baggage in one enormous funeral pile rather than surrender; but by the advice of Aëtius he was allowed to retreat. According to contemporary historians, of his army of 700,000 some 250,000 or 300,000 were left dead upon the field. He recrossed the Rhine and retired into Pannonia (A.D. 451).

After having reinforced his army, Attila determined to enter Italy, and to demand as wife the Princess Honoria, the sister of Valentinian, whom he had asked for before without success. He crossed the Alps in the beginning of A.D. 452, and destroyed Aquileia, Verona, Mantua, Crenona, Brescia, and Bergamo underwent the same fate. While Attila was encamped on the banks of Lake Benacus, he was approached by a supplicatory embassy, led by Pope Leo I. He received him with kindness and respect, and consented to a truce with Rome, the duration of which was to depend either on the fulfilment of his claims on the Princess Honoria, or the payment of a proportionate ransom. Jornandes states that, on the signature of this treaty, Attila retired beyond the Danube.

Attila died in 453, either from the bursting of a blood-vessel, or more probably from assassination.

Jornandes describes Attila as low in stature, broad-chested, and of powerful frame; dark-complexioned, with a few straggling hairs in the place of beard; with a large head, flat nose, and small eyes. His carriage was fierce and haughty. His empire was overthrown and disjoined, immediately upon his death, by the disputes and dissensions of his sons and chieftains.

(Jornandes, "De Rebus Geticis," and Priscus, "Excerpta de Legationibus," furnish the best ancient materials for the history of Attila. The account of the embassy by Priscus is translated in Guizot's "Histoire de la Civilisation en France," tom. iii. See also Gibbon's "Decline and Fall of the Roman Empire," and Kingsley's "The Roman and the Teuton.")

ATTLEBROUGH, a market-town in Norfolk, 14½ miles S.W. from Norwich, and 110 from London by the Great Eastern Railway, is a small place, consisting of one principal street, with the houses well built of brick. The church is a Perpendicular building, with a square embattled tower. There is a corn market, and a neat market-house was erected in 1863. The population in 1881 was 2000. The town is of great antiquity, and was the capital of East Anglia in the reigns of Offa and Edmund.

ATTOCK, a town and fortress on the east bank of the Indus, in the Punjab. It stands on a black slaty ridge. The Indus having been joined by the Cabul River a short distance above Attock, flows in a tranquil stream about 260 yards wide and 35 fathoms deep under the walls of the town. The fortress was formerly the residence of the Afghan government, and was then a place of considerable importance. It was taken by the Sikhs in 1813, and remained in their possession until its conquest by the British in 1849. Attock is about 40 miles from Peshawur, and by means of an important railway bridge, completed in 1883, there is now direct communication, without break of gauge, from Calcutta and Bombay to within a few miles of the Khyber Pass, in Afghanistan.

ATTORNEY is a person substituted, from *atourner*, *atournare*, to substitute, and signifies one put in the place

or *turn* of another to manage his concerns. The term is now commonly confined to a class of qualified agents who undertake the conduct of legal proceedings for their clients.

Before the statute 13 Edward I. c. 10, suitors could not appear in court by attorney without the king's special warrant, but were compelled to appear in person, as is still the practice in criminal cases. The authority given by that statute to prosecute or defend by attorney formed the attorneys into a regular body, and so greatly increased their number that several statutes and rules of court for their regulation, and for limiting their number, was passed in the reigns of Henry IV., Henry VI., and Elizabeth.

An attorney-at-law corresponded to the *procurator* or proctor of the civil and canon law, and of the ecclesiastical courts.

Solicitors appear to have been at first distinguished from attorneys as not having the attorney's power to bind their principals. In later years the distinction was between attorneys as the agents and practitioners in the courts of common law, and solicitors who took charge of proceedings in Parliament, the Privy Council, courts of Chancery, &c. In practice, however, and in ordinary language the terms became in course of time synonymous. Finally the Judicature Act of 1873 (sec. 87) and 1875 (sec. 14) abolished entirely the distinction between attorneys, solicitors, and proctors, and gave to those who had practised under either name in different courts the title of Solicitors of the Supreme Court, thus formally sanctioning a nominal alteration which had already been virtually made by professional choice and practice. It was also directed that existing enactments and statutory documents should be adapted to this change by the various judges.

Attorneys duly admitted in any of the divisions of the Supreme Court have a right to be admitted and to practise in any of the courts in the kingdom—a right which may be enforced by mandamus. They may act as advocates in certain of the inferior courts. Conveyancing, formerly considered the exclusive business of the bar, is now often performed by attorneys. Barristers are understood to require the intervention of an attorney in all cases that come before them professionally, although in criminal cases the prisoner not unfrequently engages a counsel directly by giving him a fee in open court. Barristers also frequently plead in county courts without receiving instructions from an attorney.

In Ireland the position of attorneys is almost exactly the same as in England. In Scotland the professional classes corresponding to attorneys or solicitors are called Solicitors in the Supreme Courts and Writers to the Signet.

1. *The Admission of Attorneys to Practise.*—By the 6 & 7 Vict. c. 78, passed in 1843, the laws relating to attorneys and solicitors practising in England and Wales were consolidated. In the Act care was taken to prevent unqualified persons practising.

No person, unless he has taken a degree at the universities of Oxford, Cambridge, Dublin, Durham, or London, can be admitted an attorney or solicitor without serving a clerkship of five years to a practising attorney in England and Wales, and having undergone an examination; but a person who has taken the degree of Bachelor of Arts or Bachelor of Law at any of the above-mentioned universities can be admitted after having served three years. The degree in arts must have been taken within six years after matriculation, and in law within eight years; and the articles of clerkship must commence within four years after the degree has been taken. There is a provision which enables a clerk to serve one year of his articles with a barrister or special pleader, and one year with a London agent. By the 23 & 24 Vict. c. 127, an article clerk has now to undergo an intermediate examination during the service under his articles. The examination for attorneys is now, however, chiefly regulated by the 40 & 41 Vict.

c. 25, which vests in the Incorporated Law Society, as to the preliminary, intermediate, and final examinations, powers which had been vested in certain judges of the High Court of Justice. Any attorney may practise in all courts and before all persons having power or jurisdiction in matters ecclesiastical in England, and is qualified to apply for notarial faculties, and generally to fulfil all the functions of a proctor.

Before a clerk can be admitted an attorney he is required to make affidavit of having duly served, and he next undergoes an examination by the several examiners appointed by the Incorporated Law Society. Eighty or ninety questions are to be answered, arranged under the following heads:—1, common and statute law, and practice of the courts; 2, conveyancing; 3, equity and practice of the courts; 4, bankruptcy and practice of the courts; 5, criminal law, and proceedings before justices of the peace.

2. *The Duties, Functions, Privileges, and Disabilities of Attorneys.*—The principal duties of an attorney are care, skill, and integrity. He is not responsible for mere error or mistake. If he be deficient in proper skill or care, and a loss thereby arises to his client, he is liable to an action. When an attorney has undertaken a cause he cannot withdraw from it; and though he is not bound to proceed if his client neglect to supply him with the necessary money, yet before an attorney can abandon the cause on the ground of want of funds, he must give a reasonable notice to the client of his intention. When deeds or writings come to an attorney's hands in the way of his business as an attorney, the court, on motion, will make a rule upon him to deliver them back to the party on payment of what is due to him on account of professional services and disbursements; but, unless they come to his hands strictly in his business as an attorney, the court will not make a rule, but leave the party to bring his action against the attorney.

An attorney duly enrolled and certificated is considered to be always personally present in court, and on that account has still some privileges. An attorney is exempt from offices requiring personal service, as those of sheriff, constable, overseer of the poor, and also from serving as a juror.

3. *The Consequences of an Attorney's Misbehaviour.*—The court which has admitted an attorney to practise exercises a summary jurisdiction over him, either for the benefit of his clients or for his own punishment in case of misconduct. If he is charged on affidavit with fraud or malpractice, contrary to justice and honesty, the court will call upon him to answer the matters of the affidavit; and if he do not distinctly deny the charges imputed to him, or if he swear to an incredible story in disproof of them, the court will grant an attachment. If the misconduct of the attorney amount to an indictable offence, the courts will in general leave him to be indicted by the party complaining. If the attorney has been fraudulently admitted, or has been convicted of felony, or any other offence which renders him unfit to practise, or if he has knowingly suffered his name to be used by a person unqualified to practise, or if he has himself acted as agent for such a person, or if he has signed a fictitious name to a demurrer purporting to be the signature of a barrister, or otherwise grossly misbehaved himself, the court will order him to be struck off the roll of attorneys; but in some instances the court will permit him to be restored. An attorney may procure his name to be struck off the roll on his own application, which is done when an attorney intends to be called to the bar; but it is necessary for him to accompany his application with an affidavit to the effect that he does not make the application in order to prevent any other person making it against him.

4. *The Attorney's Remedy for recovering his Fees.*—An attorney may recover his fees from his client in an action, which he may maintain for business done in other courts as well as in that of which he is admitted an attor-

ney. On application of the party chargeable, the court, or a judge or baron of the court in which the business is done, may refer the bill to be taxed by the proper officer; and on the taxation and settlement of the bill, the party shall pay to the attorney, or as the court shall direct, the whole sum due on the bill; and if it is found that the attorney has been overpaid, then he shall forthwith refund. The statute only applies to fees and disbursements for business done in court. If the whole bill were for conveyancing it could not formerly be taxed, but conveyancing costs may be taxed under 6 & 7 Vict. c. 73. By the 33 & 34 Vict. c. 28, passed in 1870, agreements between attorneys and clients are now sanctioned, as to payment for services, either by a gross sum, or by a commission or percentage, or by salary or otherwise; but this power is subjected to very stringent conditions, in order that ignorant clients shall not be imposed upon. For instance, it is provided in respect of such agreements that, when for business done or to be done in court, the amount stipulated shall in no case be paid until the agreement has been submitted to the consideration of the taxing master, who, if he think proper, may require the opinion of the court or judge upon it; and such court or judge may reduce the amount agreed upon, or even cancel the agreement altogether. Any term in such an agreement which has the effect of discharging the attorney of his responsibility or of his liability in case of negligence, is declared by the statute wholly void. Another provision of the same Act, which has an important bearing on the practice of conveyancing as well as on legal business generally, is that the taxing officer may take into account the skill, labour, and responsibility involved in any matter in determining the remuneration of the attorney.

An attorney has a lien for the amount of his bill upon the deeds and papers of his client, and also on any money recovered, which have come to his hands in the course of his professional employment.

ATTORNEY, LETTER OR POWER OF. See LETTER OR POWER OF ATTORNEY.

ATTORNEY-GENERAL. The attorney-general is a ministerial officer of the crown, appointed by letters-patent. He is the attorney for the king, and stands in precisely the same relation to him that every other attorney does to his employer. The addition of the term "general" to the name of the officer probably took place in order to distinguish him from attorneys appointed to act for the crown in particular courts, such as the attorney for the Court of Wards or the master of the Crown Office, whose official name is "coroner and attorney for the king" in the Court of King's Bench. By degrees the office has become one of great dignity and importance. The duties of the attorney-general are to exhibit informations and conduct prosecutions for such heinous misdemeanours as tend to disturb or endanger the state; to advise the heads of the various departments of government on legal questions; to conduct all suits and prosecutions relating to the collection of the public revenue of the crown; to file informations, in order to obtain satisfaction for any injury committed in the lands or other possessions of the crown; to institute and conduct suits for the protection of charitable endowments in which the queen is entitled to interfere; and generally to appear in all legal proceedings and in all courts where the interests of the crown are in question.

The salary of the office (as also that of solicitor-general) was formerly derived from fees on patents for inventions; but it is now fixed at £7000 for the attorney-general, and £6000 for the solicitor-general. In addition to these salaries they are paid fees for "contentious business" on behalf of the crown, according to the ordinary professional scale.

The duchies of Lancaster and Cornwall, and the county palatine of Durham, have separate attorney-generals.

ATTRACTION, any force which draws or tends to

draw closer together any bodies or particles of bodies, is a general term to express an effect which may arise from very various apparent causes.

Thus *cohesion* or *molecular attraction* is that which so connects the molecules of a body as to fix the state of that body. If they rigidly cohere the body is solid; if they are free to roll over one another easily, but separate with difficulty, the body is viscous; when they separate readily the body is fluid; and when they tend naturally to spring asunder to considerable distances the fluid is called a gas, and one of its properties is to fill, by this elastic property, a space of any size presented to it.

Adhesion is a similar kind of attraction, but of molecules of different substances brought into close contact. Thus a flat plate suspended from one arm of a balance, and resting on a surface of water, will require a considerable weight to be placed in the other arm before it can be dragged away.

Capillary attraction is that whereby water in a glass will rise round the sides of a glass rod, or will rise up a fine tube dipped into it; the finer the tube the higher it will rise. Such tubes are capillary or hair-like (Lat. *capilla*, a hair). It is this which causes oil to rise in a wick, water in bibulous paper, &c.

Endosmose and *exosmose* are a form of attraction closely allied to capillary attraction. Whenever two liquids of different densities, capable of being mixed together, are separated by a membranous or porous partition (as is the case when a bladder full of spirit is placed in a bowl of water) a current of fluid is set up through the membrane, that fluid for which the membrane has most capillary attraction passing through it. In the case supposed, as water will wet a bladder, and spirit will not, the water will pass into the bladder (endosmose) in considerable quantities; and if the conditions are reversed, so that a bladder full of water is placed in a bowl of spirit, the water will almost all pass out of the bladder (exosmose). The water fills the pores of the membrane by capillary attraction, mixes with the fluid on the other side, is no longer held by the attraction, and is therefore pushed forward by succeeding particles of water. At the same time a certain small quantity of the second fluid is always exuded into the first. In the case named a very small quantity of spirit would pass through the membrane into the water.

Chemical affinity is another form of attraction between the particles of bodies. [See AFFINITY, ATOMIC THEORY.] The difference between chemical union and physical mixture is very great, for a chemical compound may have totally different properties from those of the substances which compose it.

Electrical attraction is that property of electricity whereby electrified bodies attract those electrified differently from themselves. Thus bodies electrified positively attract those electrified negatively, and repel those electrified like themselves positively. This repulsion between bodies similarly electrified may, however, be explained as resulting from the attraction of surrounding bodies, whose electric equilibrium has been disturbed by the effects of induction. [See ELECTRICITY.] The attraction shown between bodies electrified either positively or negatively, and neutral bodies, can be explained in the same way as resulting from induction. It is found also that wires which are conveying currents of electricity in the same direction are powerfully attracted one to the other, but if they are conveying currents in opposite directions they repel each other with equal force.

Magnetic attraction is that property which enables certain ferruginous ores to attract iron, &c.; and this property can be transmitted by contact to bars of iron, hence called *magnets*. The earth itself is a vast magnet; and a suspended magnet is found to be attracted by the earth so as always to present one end to the north. This is called the north pole of the magnet, and forms the basis of the mari-

ner's compass—the universal guide for travellers, since it enables them at once to determine the direction of any given point with reference to the north. The opposite end of the magnet is called the south pole. If the north pole of one magnet be made to approach the south pole of another they attract each other; but, just as with electrical attraction, like poles repel each other. Magnets can also be made by the action of electricity, but electro-magnets are only powerful for attraction during the passage of the electric current. An electro-magnet is made by coiling the wire which conveys the electric current round a soft iron bar, and such a bar bent into a U shape can support enormous weights whilst under the influence of the current. If a bar of steel, instead of soft iron, be used in this way it becomes permanently magnetic. Nickel, cobalt, and a few other substances are also magnetic.

Finally, the attraction of *GRAVITATION* remains to be noticed. It had always been observed that all bodies fell to the earth, and the idea that possibly this attraction of gravity held good throughout the entire universe existed in some scattered hints upon the principle, to be found in writers of all ages previous to the time of Newton—sometimes as a mere word expressive of an unknown cause, but more frequently upon the assumed principle that like things must always move towards like. Mention of something of the kind is found in Aristotle, Plutarch (who records it as a very ancient opinion that the moon's centrifugal tendency was balanced by her weight), Lucretius, and other ancient writers. Roberval, Kepler, Galileo, Borelli, and others, revived the idea, but without deducing any phenomena, except that of the descent of falling bodies, which was explained by Galileo. Boullaud suggested that the law of attraction must be the inverse square of the distance, but without any substantial reason. Huyghens found the law of the centrifugal and centripetal forces of a body moving in a circle; and Hook described the principal phenomena in 1674, in terms remarkably curious, but without deducing any of the heavenly motions. It was Newton who first perceived that the curved path of the moon resembled that of a projectile, and that the moon in fact was perpetually falling to the earth; and from his careful working out of this problem of the moon's motion he was able to pass readily to the planetary motions and to the idea of universal gravitation. But he is careful while investigating the *how* not to touch the *why*. He proves that gravitation acts according to the law of inverse squares—that is, that a body at twice the distance attracts with only *one-fourth* of the power, at three times the distance it has only *one-ninth* of the power, and so on; he never investigates what it *is*, this wonderful power, nor in what manner it effects its work. But it is better to quote Newton's own words in the ever-famous "*Principia*":—

"Thus far I have explained the phenomena of the heavens and the sea by the force of gravity; but I have *not yet* assigned the cause of gravity. . . . The reason of these properties I have *not yet* deduced from phenomena, and I do not invent hypotheses. For whatever is not deduced from phenomena is called *hypothesis*; and hypotheses, be they metaphysical, physical, of occult qualities, or mechanical, have no place in experimental philosophy. . . . It is enough that gravity really exists, and acts according to laws laid down by us; and suffices to explain all the motions of the heavens and the sea."

What general principle may underlie all these various phenomena we must not, warned by the great Newton, pretend to say; but a general consensus of opinion, based on observed facts, is growing up, that the law of inverse squares is a part of such an underlying principle, for it applies to almost every form of attraction. Coulomb showed by the "*torsion balance*" that it holds true to the greatest exactness for electricity, and other inquirers have more or less clearly shown it with other forms of attraction.

Another general idea, hardly as yet definitely formulated, is that nothing can act at a distance. The researches of Faraday into *dielectrics* (the mediums across which the electrical forces act, apparently at a distance) show that they are always strained during a discharge, and the opinion of many foremost electricians is that they play a very important part (if not even the most important part) in those phenomena which used to be thought to be produced almost independently of them. Attraction *may* therefore be ultimately brought under one comprehensive formula, and *may* be shown to act universally through contact with the intervening medium, and not from body to body at a distance. But these are the problems of the immediate future, and are as yet unsolved. The reader is referred for more detailed information to the separate articles ELECTRICITY, MAGNETISM, GRAVITATION.

ATTUS NAVIUS was a famous augur in the time of Tarquinius Priscus, fifth king of Rome. The king was about to remodel the constitution, by admitting citizens to patrician rank, and Attus Navius withstood him in the name of the gods. Romulus had founded the state, and it must stay as he founded it, or untold miseries would ensue. The king laughed (it must be remembered that he was a Greek by race, not a Roman), and asked if this augury, so confidently appealed to, could declare whether what he was thinking of at the moment were possible. After consulting the omens Attus Navius declared that the thing was possible; and nothing dismaying when the king produced a whetstone and a razor wherewith to cut it, he set firmly to his task and cut the whetstone asunder. The king, astounded, yielded his point; and the augur's statue was erected on the site of the miracle, the whetstone beside it, and both remained as testimonies for centuries.

The story is so famous and so typical that it is worth preserving, especially as it is sometimes wrongly told. It is almost a pity to have to add that Attus Navius was himself a patrician, one of the tribe of the Tities, not therefore by any means an unprejudiced witness.

ATTWOOD, THOMAS, a musical composer, was born in 1765, his father being a trumpeter, viola player, and coal merchant. He commenced his professional education as one of the "children of the Chapel-Royal" under Dr. Nares, and his successor Dr. Ayrton. On the change of his voice, and consequent retirement from the king's service, he was sent abroad, by and at the expense of his patron the Prince of Wales, for the purpose of completing his studies in the schools of Italy. He first went to Naples, where he studied under Filippo Cinque and Gaetano Latilla; but he received far more valuable instructions from Mozart, whom he visited at Vienna. On returning to England young Attwood was made one of the chamber musicians to the king. Afterwards he was appointed musical preceptor to the Duchess of York and the Princess of Wales. In 1795 the dean and chapter of St. Paul's elected him as organist of that cathedral; and in the following year, on the death of Dr. Dupnis, he was appointed composer to the Chapels-Royal. For the coronation of George IV. he wrote his fine anthem "I was glad," and for that of William IV. another almost equally fine, "O Lord, grant the king a long life." In 1837 he was appointed organist of the Chapels-Royal. He died in March, 1838, and his remains were deposited in St. Paul's Cathedral, under the organ.

His compositions are always meritorious, and some few really fine; but it is likely that he will be better known by having been the favourite pupil of Mozart as a youth, and the warm friend of Mendelssohn in his later years, than by his own works. Attwood's villa at Norwood is familiar ground to readers of Mendelssohn's letters, and some of the best works of Mendelssohn are dedicated to Attwood, who had the rare felicity to be perhaps the first English musician who acknowledged the greatness of the young composer.

A'TYPUS (misshapen: Gr. *a*, not; *tupos*, shape) is a glossy reddish-brown spider, with a very large head and short thick legs. It is the only British spider belonging to the same family as the "bird-killing spider," MYGALE. It excavates a tunnel in the ground, inside of which it spins a tube of white silk. Having covered the entrance of its den with the same material, it takes up its abode at the end of the tunnel. Here the female constructs a silky cushion, formed of fibres of plants, on which she places the cocoon containing her eggs. The female is about half an inch long; the male is smaller and much darker. The atypus has four large eyes forming a curved line above the face, and two small eyes above each of the two outside large eyes. The poison-fangs are very prominent; they are strong and furnished with teeth on the under side; they move vertically up and down, not from side to side as do those of all other British spiders. There are three claws on each foot. See SPIDER.

AUBAGNE, a town of France, in the department of Bouches de Rhone, 10 miles E. of Marseilles, is built on the slope and at the foot of a hill on the left bank of the Huveanne. Coarse woollens, china, pottery, brandy, leather, and paper are manufactured. There is a good trade in the wines of the neighbourhood, and in dried fruits. The church was built in 1164, and there is a fountain to the memory of the Abbé Barthelemy, whose family was long connected with the town.

AUBAINE, a right of the French kings, under which they claimed the property of every stranger who died in their country without having been naturalized. It was abolished by the National Assembly in 1790-91, re-established by Napoleon in 1804, and finally annulled on the 14th of July, 1819.

AUBE, a department of France which consists of Basse Champagne and a small part of Burgundy. It is bounded N. by the department of Marne, E. by that of Haute-Marne, S. and S.W. by that of Yonne, and N.W. by that of Seine-et-Marne. Its length from E. to W. is 69 miles, from N. to S. 54 miles; the area of the department is 2351 square miles. The population in 1882 was 255,326.

With the exception of some undulations, which increase in height towards the south and east, the department is a dead level. The soil in the north and north-west consists of a thin vegetable mould, which rests on a bed of chalk. This region is bare of trees and unfit for tillage, but abounds in sheep-pasture; the flocks, however, suffer much from want of shade in summer. The south-east of the department is very fertile; the soil is rich and deep, and in some places so stiff that it is not rare to see as many as a dozen horses yoked to one plough. Corn of all kinds, fruits, pulse, hemp, rape, and hay are produced in this part in great abundance; a considerable breadth of land is under vineyards, which produce excellent wine. The west of the department is marshy. There is little mineral wealth; iron is found, but no mine is worked; limestone is abundant; building stone, potter's clay, marl, and pipe-clay are found. Turf also is found in some districts, but the fuel of the department is supplied by its forests, the principal of which are those of Clairvaux, Chaource, Montmorency, Orient, and Soulaimes. There are a few mineral springs. The climate is mild and healthy, except in the west.

Horses, horned cattle, sheep, and swine are numerous, as are also geese, ducks, and turkeys. Deer and wild boars are abundant in the forests, fish is plentiful, and bees are carefully tended all through the department. The principal manufactures are broad cloth, cotton stuffs, and hosiery. Leather, coarse cloth, cambric, silk, linen, and gloves are also made. Besides these fabrics the department has numerous potteries, tile, porcelain, and glass works, paper mills, distilleries, vinegar yards, beet-root sugar factories, rope-walks, starch factories, dyeing and bleaching

establishments. The trade of the department is in the agricultural and manufacturing products already mentioned, together with cheese, wool, sausages, firewood, and charcoal. Large corn markets are held weekly at Troyes and Bar-sur-Aube.

The department is crossed from S.E. to N.W. by the Seine, which passes the town of Bar-sur-Seine, where it receives the Cure; Troyes, near which the Barse falls into it; and Nogent. The Aube rises in the south of the department of Haute-Marne, and flowing N.N.W. enters that of Aube a little S. of Clairvaux, passes the towns of Bar-sur-Aube and Arcis-sur-Aube, whence it turns westward and falls into the Seine at Marcilly on the borders of Marne, after a course of about 124 miles. It is navigable from Arcis-sur-Aube; its principal feeders are the Anjon, the Voire, on the right bank; the Landion, the Amance, and the Auzon, on the left. The other rivers are—the Laigues, which drains the district of Les Riceys, and flows N. into the Seine; the Armanche, which rises near Chaumou, at a little distance from which it turns westward, and passing Evry falls into the Armançon, a feeder of the Yonne; and the Vannes, which rises a little north of Estissac, below which it flows westward and falls into the Yonne near Sens, in the department of the Yonne.

The department is divided into five *arrondissements*—viz. Troyes, Arcis-sur-Aube, Bar-sur-Seine, Bar-sur-Aube, and Nogent-sur-Seine.

AUBENAS, a town of France, in the department of Ardèche, on the right bank of the river of that name, 14 miles S.W. of Privas. It stands on a hill in a beautiful situation, but the streets are generally crooked and narrow. The town is the centre of a considerable trade in raw and manufactured silk, sweet chestnuts, and wine; woollen cloth, handkerchiefs, and white leather are manufactured, and there are above sixty silk mills in the neighbourhood. The population in 1882 was 7700.

AUBER, DANIEL FRANÇOIS ESPRIT, the great French musician, was the son of an opulent printseller of Paris, and was born at Caen, in Normandy, during a visit of his parents to that city, on the 29th of January, 1784. His father designed him for a mercantile life, and though he placed him under M. Ladurner to learn the pianoforte, it was only for the purpose of giving him an elegant accomplishment that would grace his appearance in society. He was placed in a commercial house in London; and here, in the hours not devoted to his office, he won constant admiration, not only by his playing, but by the little romances he composed with the greatest fluency. His stay in this country was cut short by the unsettled politics of the time (1804); and on his return to Paris he amused himself by producing a series of amateur compositions, the favourable reception of which at private performances put an end to his commercial career. Cherubini, chief of the Conservatoire, perceived the great talent of these compositions, and himself offered to superintend his studies. It is without doubt to his training under this great master of the orchestra that Auber owed his perfect command over orchestral effects. Auber, however, had attained his thirtieth year before making his first public attempts, which, though in themselves abortive, were the forerunners of a series of successes equalled by no other French composer, and, indeed, by no other composer of any country, Rossini, the Italian, alone excepted. "Le Séjour Militaire," a one-act opera, produced in 1813 at the Theatre Feydeau, was a failure; nor was the "Testament et les Billets-doux," given six years later, more fortunate. But the year after, Auber gave "La Bergère Châtelaine" at the Opera Comique; and this genial and charming work was the commencement of his thenceforward brilliant career. "La Bergère" was followed in rapid succession by eight other operas, the last of which, "Fiorella," was brought out in 1826. Among these eight operas we may point to "La Neige," "Léocadie," and "Le

Maçon" as all—"Le Maçon" especially—likely to endure. Auber had the peerless good fortune to fall in with a librettist who was, as it were, his other self—we allude to the famous Scribe. It is to the felicity of Scribe's situations and the ingenuity of his plots, exactly suited to call out Auber's highest powers, that a very great deal of the wealth of pleasure the world has received from this source is due. In the early spring of 1828 he composed, not now for the Opera Comique, but for the great stage of the Académie Royale de Musique, the opera upon which, bearing in recollection all his other masterpieces, his reputation is chiefly based. We refer to "La Muette de Portici," known in England (where for more than forty years it has been even more popular than in France) as "Masaniello." This magnificent work, with its gorgeous wealth of melody, its piquant and varied harmony, its superb orchestration, and its vivid "local colouring," may, although less elaborately conceived, and not aiming at so high a mark, be put side by side with "Guillaume Tell." It at once placed its composer on the pinnacle of fame. Many and admirable as were the works that came afterwards from the brain of its prolific and untiring author, not one surpassed, if any, indeed, equalled it. Wagner, admittedly the greatest master till now of the orchestra, and a critic least of all likely to be partial to the style of Auber, acknowledged the orchestration of "Masaniello" to be superb. It was brought out on the 29th of February, 1828, when Auber was in his forty-seventh year.

The fame of Auber is almost, if not quite, as much English as French. From the time that an English version of "La Muette" was introduced in London under the title of "Masaniello," about a year later than its production in Paris, work after work by this wonderfully gifted composer was essayed at our English theatres. We had, for example, "La Fiancée," "Fra Diavolo," the "Pilltro" (on the same subject as Donizetti's "Elisir d'Amore"), the "Maid of Cashmere" ("Le Dieu et la Bayadère"), "Gustavus III.," the "Coimers" ("Le Serment"), "Lestocq," the "Ambasadress," the "Siren," the "Crown Diamonds," the "Black Domino," "Haydée," "Marco Spada," &c. Auber, indeed, though a foreigner, did more for the British lyric stage than any native composer of his time. His melodies are as familiar to us as household words, being of such a stamp that, like some of our English, Irish, Welsh, and Scottish tunes, they can never grow stale, and are endowed with perennial freshness.

Auber, who began so late as a dramatic composer, made up for this tardiness by writing operas at an age when it might be fairly imagined that his invention was exhausted. Altogether he wrote between forty and fifty operas, the last but one of which, "Le Premier Jour de Bonheur," although written at the age of eighty-four, is as remarkable for spontaneity as many of the happiest inspirations of his prime. His final opera was "Rêve d'Amour," produced at the Opera Comique on the 20th of December, 1869, about a year later than "Le Premier Jour de Bonheur." Between "La Fiancée du Roi de Garbe," given at the same theatre, and "Le Premier Jour de Bonheur," the octogenarian composer had allowed himself four years of rest; hence, no doubt, the singular freshness of his penultimate essay, the success of which induced him too eagerly and hastily to set to work again. "Rêve d'Amour," which is the last, is the weakest of all its composer's dramatic works.

Auber's long career after 1820 was one uninterrupted course of prosperity and success, crowned long before its termination with honours and wealth. He was Maître de Chapelle to Louis Philippe, and held the same office under the Emperor Napoleon; he was, besides, director of the Conservatoire. He was in himself as truly Parisian as his exquisite music, which so admirably reflects the most polished and brilliant aspect of that phase of life and thought; and the greater part of his existence was passed

in the atmosphere of the Boulevards, in whose immediate neighbourhood his charming strains first found voice. No composer of any age or country has ever been more thoroughly reflective of his period and nation than Auber: his music is as intensely French as that of Weber is German; and although no two styles can be more dissimilar, they are each probably destined to equal immortality by the genius and the truth of expression which characterize both. As a man, independently of his artistic claims, Auber was wonderfully popular. No less witty than his contemporary and idol Rossini, a bust of whom was in every room of his house, he was at the same time no less amiable and fascinating; and it may be said, without fear of contradiction, that he died universally regretted.

Auber's death, at the advanced age of eighty-nine, took place on 13th May, 1871, while Paris, the most magnificent capital of Europe, was torn and distracted with the civil strife which had followed upon the heels of the most sanguinary and disastrous war in which France ever engaged. At any other than such a time as this his death would have created as much excitement in Paris as that consequent upon the death of Rossini three years before. As it was, Auber passed away almost unnoticed by his countrymen, to whose delight he had ministered for upwards of half a century. He died, however, full of years and of glory.

AUBIN, a town of France, in the department of Aveyron, 20 miles N. of Villefranche. Near the town are rich coal mines. There are also mines of sulphur, alum, and iron, and several large iron furnaces in the neighbourhood. The population in 1882 was 9000.

AUBINS, ST., a small seaport of Jersey, very picturesquely situated in the western angle of St. Aubin's Bay, $4\frac{1}{2}$ miles from St. Heliers. It consists chiefly of one street of about 100 houses, with nearly as many more in different directions. There is a good pier, but the depth of water is not sufficient for large vessels. The place is defended by a small fortress, which is insulated at high water. The population in 1881 was 1000.

AUBURN, a town in the State of New York, 170 miles W. from Albany, is situated on the north outlet of the Owaseo Lake, 7 miles from the Erie Canal, which forms a communication between the river Hudson and Lake Erie. The outlet is a fine stream suitable for driving machinery. The thoroughfares are wide and lined with trees, and the houses are for the most part well built. Auburn is chiefly remarkable for its large state prison, or penitentiary, which was founded in 1816. It was at first conducted on the solitary system, but this, after two years' experience of its injurious effects on the mind as well as the body, was changed for the silent system, in which the prisoners work in company, but without being allowed to speak. There are generally about 1000 prisoners, who are, as far as possible, employed in the work to which they have been trained. The proceeds of their labour nearly defrays the expenses of the institution.

Auburn possesses a Presbyterian theological seminary, several churches and schools, and has some manufactures of cotton and woollen goods, carpets, and agricultural implements, and numerous mills. The population in 1880 was 21,924.

AUBUSSON, a town of France, in the department of Creuse, on the river of that name, is situated in a wild rocky defile 20 miles S.E. from Guéret. It is an ill-built but improving town, with a tribunal of first instance, and 6500 inhabitants, who manufacture carpets, tapestry, coarse woollens, and calicoes. The town has also woollen and cotton yarn factories, dye-houses, and tanyards. The tapestries of Aubusson are considered the best in France, after those of Gobelins and Beauvais.

AUCHE, the capital formerly of Armagnac and Gascogne, now of the department of Gers, in France. It is an ancient city, and takes its name from the Ausci, a Gallic tribe, of

whose territory it was the capital. It is 42 miles W. of Toulouse, and 423 miles S.S.W. of Paris, and has a population of 13,000. The city is divided by the river Gers into an Upper and Lower Town, the former of which is built on the slope of a steep hill, and one means of communication between them is by a flight of 200 steps. The streets are narrow and crooked, but well paved, and a fine promenade in the upper part of the town affords a splendid view of the surrounding country. Auch is the seat of an archbishopric founded in the fourth century, and which gave the title of Primate of Aquitania to the holder of the see until the French Revolution. The cathedral, which was commenced in 1489, is one of the finest in France. It is of various styles of architecture, and contains some handsome monuments and carved woodwork, and has some stained-glass windows. The archiepiscopal palace, a large and handsome building, is now used as the prefecture. There are also in the town an hospital, public library, college, and museum. The principal manufactures are hats, linen and cotton stuffs, and leather, and there is a large trade in the brandies of Armagnac.

AUCHTERAR'DER, a town and parish of Scotland, once a royal burgh, in the county of Perth, about $13\frac{1}{2}$ miles from the city of that name. It consists chiefly of one street about a mile long. The population in 1881 was 2854, many of whom are employed in the manufacture of shirtings and galas. The chief public buildings are the town-hall and the Aytoun Public Hall. In this parish originated the dispute regarding the Veto Act, which led to the disruption of the Church of Scotland in 1843.

AUCHTERMUCH'TY, a royal burgh of Scotland, in the county of Fife, is situated near the head of the river Eden, 10 miles W. by S. from Cupar. The town is irregularly built, but has been much improved in recent years. It is divided into two nearly equal portions by the Lovers' Pool, a small but rapid stream. The principal trade is the manufacture of linen and cotton goods for houses in Dundee, Dumfermline, and Kirkealdy. There are also some large malting establishments. The population of the royal burgh in 1881 was 824; of the town, 1673.

AUCKLAND, a county of New Zealand, consisting of the northern portion of North Island. Its length is about 400 miles, and its greatest breadth 200 miles. The total area is about 17,000,000 acres. The coast is very irregular, and there are a large number of natural harbours. The interior, which presents almost every variety of surface, is watered by several streams, some of them unavigable. There are large flocks of sheep in Auckland, but its natural wealth is principally in its gold mines and timber. The chief tree is the kawrie pine, which is of very large dimensions, and is peculiar to this part of New Zealand. Phormium, or New Zealand flax, grows wild over a large area. Coal has been discovered, but is only worked to a limited extent.

AUCKLAND, the capital of the above county, and the largest city in the North Island, was for some time the seat of government of the whole colony. It is situated on the northern shores of Waitemata Harbour, an inlet of Thames Gulf. There is sufficient depth of water for the largest steamers. Auckland is distant from Sydney 1313 miles E., and about 1650 miles N.E. from Melbourne. The city is most picturesquely situated, and its position for commercial purposes is equally good, as, in addition to the harbour of Waitemata, there is a western harbour, Manukau, the two being only 6 miles apart. There are numerous wharves and jetties, and a graving dock. The chief buildings in Auckland are the several banks and insurance offices, government offices, and the Government House, standing in the midst of grounds planted with English oak and other trees. There are two cathedrals and several other places of worship, two colleges, grammar and other schools, theatre, hospital, museum, and free

library. The majority of the stores and shops are of a substantial character. There is a well laid out botanical garden and two parks. The city is connected with the other parts of the colony by steamers, and there is also regular steam communication with Australia and Fiji. A railway connects Auckland with Onehunga on the Manukau Harbour, and by another the country for many miles south of Auckland is brought into direct communication with the capital. There is a good water supply to the city, derived from the Western Springs. The climate of Auckland is remarkably mild and equable. The control of municipal affairs is in the hands of a council, consisting of a mayor and nine members elected by the ratepayers. The population of town and suburbs in 1881 was 40,000; of the city alone, 16,664.

AUCKLAND, BISHOP. See BISHOP AUCKLAND.

AUCKLAND, GEORGE EDEN, EARL OF, second son of Baron Auckland, was born 1784, and succeeded his father in 1811. He joined Earl Grey's administration in 1833, and the following year became first lord of the Admiralty. In 1835 he was appointed governor-general of India, which office he held until 1841. The chief event of his administration was the deplorable war with Afghanistan, the severe disasters of which led to his recall. In 1846 he was again appointed first lord of the Admiralty, and retained the office until his death, on the 1st January, 1849. He was unmarried, and with his death the title became extinct.

AUCKLAND ISLANDS, a group about 160 miles to the south of New Zealand, which were discovered in 1806. They are of volcanic origin, and are covered with forests. They were at one time used as a whaling station, but the establishment was abandoned in 1852.

AUCKLAND, WILLIAM EDEN, BARON, an eminent statesman and diplomatist, was the third son of Sir Robert Eden, Bart. In 1778, when thirty-four years of age, he was sent with the Earl of Carlisle and Governor Johnstone to treat with the insurgent colonists of North America. He was created an Irish peer in 1789, and an English peer in 1793. He held many high offices of state, and was several times ambassador in circumstances of importance. He was the author of numerous political pamphlets which had some influence at the time of their publication, and his journal and correspondence were published in four volumes (1860-62) by his son, the Bishop of Bath and Wells. He died in 1814.

AUCTION, a method employed for the sale of property. The Romans gave it the descriptive name of *auctio*, an increase, because the property was publicly sold to him who would offer most for it. In modern times a different method of sale has been sometimes adopted, which is called a *Dutch auction*, thus indicating the local origin of the practice. It consists in the public offer of property at a price beyond its value, and then gradually lowering or diminishing that price until some one consents to become the purchaser.

The sale by auction was used by the Romans for the disposal of military spoils, and was conducted *sub hasta*, that is, under a spear, which was stuck into the ground. This expression was continued, and sales were said to be conducted *sub hasta* in cases where other property was sold by auction, and probably after the spear was dispensed with. The phrase *asta publica* is still used by the Italians to signify a public sale or auction. The expression is *vendere all' asta pubblica*, or *vendere per subasta*.

Formerly persons were sometimes invited to a "sale by the candle," or "by the inch of candle." The origin of this expression arose from the employment of candles as the means of measuring time, it being declared that no one lot of goods should continue to be offered to the biddings of the persons who were present for a longer time than would suffice for the burning of one inch of candle; as soon as

the candle had wasted to that extent the then highest bidder was declared to be the purchaser.

In sales by auction the assent of the buyer is given by his bidding, while the assent of the seller is signified by the fall of the auctioneer's hammer, and until this declaration has been made the bidder may withdraw his bidding.

It is a common practice for the owner of property offered for sale by auction to reserve to himself the privilege of bidding, and, as it is termed, buying in his goods, if the price offered by others should not suit him.

The conditions of sale constitute the terms of the bargain, and purchasers are bound to take notice of them. It is usual for these conditions to be printed and exhibited in the catalogue or notice of sale, or to be read over by the auctioneer before the sale begins. The conditions usually contain a provision that "any error or misstatement shall not vitiate the sale, but that an allowance shall be made for it in the purchase-money." But this clause is held only to guard against unintentional errors, and not to compel a purchaser to complete the contract if he has been designedly misled.

The duties of excise imposed on sales by auction during the American War in 1777 were repealed in 1845.

AUCTIONEER, a person whose business it is to conduct sales by auction. It is his duty previously to the commencement of every sale to state the conditions under which the property is offered, to receive the respective biddings, and to declare the termination of the sale. For this purpose he commonly makes use of a hammer, upon the falling of which the biddings are closed.

The law holds that an auctioneer is authorized by the highest bidder or purchaser to sign for him the contract of sale, and that his writing down in his book the name of such purchaser shall be sufficient to bind the latter to the purchase, provided no objection be made by him previous to such entry. The law also recognizes the right of an auctioneer to act as the agent of persons wishing to purchase, who may intrust him to make biddings for them. If an auctioneer declines or omits at the time of sale to disclose the name of his employer, he makes himself responsible toward the buyers for all matters in regard to which the responsibility would otherwise lie with the owner of the property sold, such as defect of title, whereby the purchaser is unable to obtain his purchase. An action for interest of the locked-up money lies against the seller, but not against the auctioneer, if the seller's name is given. The auctioneer must not part with deposit money till the sale is carried into effect. In this he occupies the position of a stakeholder.

Every person acting as an auctioneer in the United Kingdom is required by 8 Vict. c. 15, to take out a license, for which the sum of £10 has to be paid annually, and no separate license is now necessary for selling plate or other articles by auction. This statute (s. 5) does not require certain sales to be conducted by a licensed auctioneer, such as goods and chattels under a distress for less than £20 for rent or tithes.

The number of auctioneers' licenses annually issued in England is about 8500; in Scotland, 800; and in Ireland, 500.

In all sales by auction the law requires the auctioneer's name to be publicly exhibited, under a penalty of £20.

AUCUBA, the name of a dioecious plant, now commonly cultivated in the gardens of this country as a hardy evergreen shrub, remarkable for its shining pale-green leaves mottled with yellow. It is common in various places in Japan, both wild and cultivated. Its fruit, which it bears in March, is a beautiful coral-red berry, about the size of that of a laurel, and containing a single stone, with a bitter nauseous kernel. We possess a variegated kind of the plant, the well-known *Aucuba japonica*, or variegated laurel, which is highly prized for its capacity of thriving

in the vitiated atmosphere of cities. It belongs to the dog-wood order CORNACEÆ.

AUDE, a department of France which is formed of a portion of Bas-Languedoc. It is bounded E. by the Mediterranean, N.E. by the department of Hérault, N. by that of Tarn, N.W. by that of Haute-Garonne, W. by that of Ariège, and S. by that of Pyrénées Orientales. Its greatest length from E. to W. is 79 miles, from N. to S. 52 miles. The area is 2841 square miles; the population in 1882 was 327,942.

The department is mountainous. The southern extremity of the Cevennes, which takes the name of Montagne-Noire, crosses it in the north, and gradually slopes down to the valley of the Aude. A branch of the Pyrenees, leaving the main chain near Mont-Louis in the department of Pyrénées Orientales, runs N., and, entering the department of Aude, traverses it from S. to N.W., separating the affluents of the Aude from those of the Ariège. This range is connected with the Montagne-Noire by a chain of low hills near Naurouse, where is the main reservoir of the Canal du Midi, which here attains its summit level. Another projection from the Pyrenees, called collectively the Corbières Mountains, runs along the right of the Aude, and, breaking off into several branches, covers a large portion of the south and south-east of the department. A great plain, into which the mountain masses above named gradually subside, crosses the department from E. to W.; its eastern part coincides with the valley of the lower Aude as far as Carcassone, and the great Languedoc Canal, or Canal du Midi, runs along its whole length. From Carcassone the valley of the Aude runs directly S., and this part of it is the best sheltered and contains the most fertile land in the department. The other valleys also generally run N. and S., and are highly productive. The department is bounded on the E. by the Mediterranean for about 28 miles; in this space there are several salt lagoons, the largest of which are those of Leucate, Sigeau, and Bages. The climate is generally healthy, though cold, except along the Mediterranean, where it is much warmer than in the west. Impetuous winds, known as the *cers*, from the N.W. prevail during eight months of the year, and winds from the E. and S.E. during the other four. These last are just felt at Narbonne, but gathering force as they proceed inland, by the time they reach Carcassone and Castelnaudary they blow with such violence as sometimes to unroof the houses and tear up trees. The sea breeze is often laden with pestilential effluvia from the lagoons.

Wheat, maize, barley, and millet are the chief grain crops in the valleys; buckwheat, barley, oats, and rye on the high grounds. The wines are of good quality, especially the white and red wines of Limoux, the red of the neighbourhood of Narbonne, and the white of Bages.

Of fruit trees the chestnut and walnut are extensively cultivated in the highlands; the almond flourishes on the light soils; the culture of the olive is not so much attended to as formerly, but there are still some flourishing plantations in the arrondissement of Narbonne. The forest trees are chiefly the oak, ash, beech, and evergreen. Various kinds of wild animals, such as the chamois, bear, and wild boar, wolf, fox, and badger, inhabit the mountains and forests, and game of all kinds is abundant. The horses of the department are small. Asses are numerous. The extensive meadows, which are well watered, are pastured by numerous flocks and herds. Poultry of all kinds, but more particularly geese, are abundant, and are exported to the neighbouring departments and to Spain. Great attention is paid to the rearing of bees, and a large quantity of honey is gathered, which is highly esteemed, especially that of the neighbourhood of Narbonne.

Mines of coal, iron, clay, and plaster of Paris are worked; limestone, good building stone, and slate are

found. There are several mineral and salt springs. Marble of great beauty is found among the transition limestone and the lower secondary strata in the quarries of Caunes. The chief manufacture of the department is fine broadcloth; leather, hats, hosiery, paper, and pottery are made. There are numerous distilleries, flour-mills and saw-mills, furnaces and iron foundries. The exports consist of soda, which is found abundantly off the coast of the Mediterranean; salt, which is made in the salt-pans in the neighbourhood of Bages and Sigeau; and the agricultural, mineral, and industrial products before named.

The chief river of the department is the Aude (*Atax*), which springs from the small Lake of Aude, near Mont-Louis, in the department of Pyrénées Orientales, whence running from S. to N., and entering the department of Aude, it passes Quillan, Limoux, and Carcassone; at this last town turning eastward it passes Trèbes, about 24 miles below which it sends off a branch to the S.E., called the Robine, while the main stream, pursuing its eastward course, falls into the Mediterranean near the lagoon of Vendres. The Robine has been rendered navigable, and forms part of the canal from the Canal du Midi through Narbonne to the Mediterranean. The whole length of the Aude is about 140 miles, of which 123 miles are in the department of Aude. The feeders of the Aude are about 30 in number; the most important of these are the Orbien on the right, the Rebenti, the Fresquel, the Clamouse, and the Cesse on the left. The south-eastern angle of the department is watered by the Bère, which falls into the lagoon of Sigeau.

The department is divided into the four arrondissements of Carcassone, Limoux, Narbonne, and Castelnaudary.

AUDEBERT, JEAN BAPTISTE, was born in 1759, at Rochefort, in France. When seventeen years of age he went to Paris to study the arts of design and painting. In 1789 he became acquainted with M. Gigot d'Orcy, a wealthy amateur distinguished by his taste for natural history, who employed Audibert to paint the most rare objects in his magnificent collection. This occupation gave a bias to Audibert in favour of natural history, which soon amounted to an ardent passion. His first work was "Histoire Naturelle des Singes (Monkeys), des Makis, et des Galeopithèques." This work was a large folio, with sixty-two coloured plates, remarkable alike for their truth and beauty, and it at once raised its author to celebrity. Audibert united in his own person the characters of painter, engraver, and author. Having carefully investigated the different modes of colour-printing, he improved upon these so much that he may be said to have invented a new mode, and to have carried it to the highest degree of perfection. This improvement consisted in putting all the colours on one plate at once, instead of using as many plates as there were colours. He made a further improvement by using oil instead of water colours. He also succeeded in printing with gold. In his "Histoire des Colibris (Humming-birds), des Oiseaux-Mouches, des Jacanars, et des Promerops" (one vol. large folio, Paris), the expression and position of the birds are so perfect as to make them appear animated; and the descriptions, of which he is likewise the writer, are worthy of such a work.

Scarcely were these works commenced before Audibert began to plan others—the History of Birds, of the Mam-miferæ, and lastly that of Man. He had thus planned for himself work enough to occupy a long life; but in 1800 death carried him off in the forty-second year of his age. Audibert was not more remarkable for his talents than beloved for his amiable manners and generosity of disposition.

AUDI'ANS or **AUDE'ANS**, a sect of heretics, so called from their founder Audius or Audæus, who lived in the fourth century. Having begun by attacking the manners of the clergy, and perhaps also the government

of the church in Mesopotamia, his birthplace, he proceeded in this line till he was expelled from the body of the faithful; upon which he assumed the episcopal office, and was hereupon immediately banished by the Emperor Constantius to Scythia. Among various erroneous opinions and practices attributed to Audius that of anthropomorphism, or the resemblance of the Deity to the human form, seems to be the best established; but as we are dependent for all we know of him upon the statements of the orthodox theological writers of that and the next age—Athanasius, Augustine, Epiphanius, and Theodoret—we really have no fair means of arriving at the opinions he actually held.

AUDIPHONE, a most ingenious instrument for enabling certain classes of deaf persons to hear, invented by an American of the name of Rhodes in 1880. It consists of a sheet of ebonite, quite thin and flexible, a little bowed (and therefore strained) by silk cords, and is of the shape and size of an ordinary Japanese palm-leaf fan. It is held by a handle, just as a fan, and the edge of the "blade" is pressed against the eye-tooth. The person conversing with the deaf person simply directs his voice towards the audiphone, and this, being set into vibration by the sound, communicates the impulses or vibrations to the bones of the head through the tooth, and thus to the bony labyrinth of the ear. The slightest variations in quality of tone, in pitch, &c., can be perfectly detected by him who never before heard a sound. It is manifest that the invention is only of service to those whose inner ear is perfect, but whose outer ear, whether from a defective drum or any other such cause, does not convey the sound. Unhappily, these cases are very much less numerous than those where deafness arises from defects in the inner ear.

AUDITOR is the Latin word *auditor*, which simply means a hearer. The use of the word to signify one who examined into accounts and heard and judged evidence of expenditure is of great antiquity.

The auditors of the impost were ancient officers co-existent with the auditor of the exchequer. They were abolished in 1785, when "commissioners for auditing the public accounts" were appointed by 25 Geo. III. c. 52. The number of these commissioners (originally five) was increased to ten by the 46 Geo. III. c. 141. It was afterwards reduced to six. They were empowered to examine persons on oath, and to do all acts concerning the audit of public accounts.

By the 46 Geo. III. c. 141, s. 8, all accountants of public moneys were to transmit to the commissioners, within three months after 31st December, or within three months of such day as the lords of the Treasury should order (2 & 3 Will. IV. c. 104), accounts of all sums received and paid by them for the public service within the preceding year, together with proper vouchers for such receipts and payments, and a schedule of the same, which schedule was to be compared with the vouchers by an officer in the audit office. The commissioners could call on all public accountants, whenever they thought fit, to account to them for the receipt, expenditure, or issue of all moneys or stores entrusted to them, and on failure they were to certify the defaulters' names to the remembrancer of the exchequer, the attorney-general of England or Ireland, and lord-advocate of Scotland, in order that proceedings might be taken to compel them to account, unless, on the defaulter's application, the lords of the Treasury thought it proper to stay the proceedings for a reasonable time. By the statute 1 & 2 Geo. IV. c. 121, it was enacted that on the 5th day of January, 5th day of April, 5th day of July, and the 10th day of October, general imprint certificates should be made out at the exchequer, specifying all moneys and exchequer bills issued at the receipt of the exchequer within the preceding quarter, and these certificates were to be transmitted to the commissioners of audit within thirty days after each quarter-day; and by the 10th section of

the 46 Geo. III. c. 141, the paymaster of the forces, the treasurers of the navy and ordnance, and all other public officers who issued to any persons money for public services by way of imprest or on account, were required, within three months after the 31st December in every year, to transmit to the commissioners of audit a certificate of such moneys, with the names of the persons to whom paid. By the 2 Will. IV. c. 26, the commissioners were authorized to audit the accounts of receipt and expenditure of the colonial revenues; but this is no longer done except in the cases of those colonies which receive grants from the mother country.

In 1866 the commissioners of audit were abolished, and by the 29 & 30 Vict. c. 39, their duties were transferred to a comptroller of the exchequer and auditor-general, who reports annually to Parliament on the expenditure of all moneys voted, and under whose superintendence a large number of non-voted accounts are also examined and audited. In 1875 an entirely new branch was added to the department for the purpose of auditing the Chancery funds—the control of which had been undertaken by the government. Subsequently the department was ordered to undertake the audit of the army and navy accounts in detail. The exchequer and audit office is at Somerset House, and is under the control of the lords of the Treasury.

Under the Act passed in 1844 for the further amendment of the poor law, the poor-law commissioners were empowered to combine parishes and unions into districts for the audit of accounts (7 & 8 Vict. s. 32). The office of auditor under the local government board is one that requires integrity, knowledge of accounts, and an exact acquaintance with the statutes and authorities by which the expenditure of the poor rates is regulated. The appointment of auditor was formerly vested in the boards of guardians, a rule inconsistent with sound principle, and he is now appointed by the government direct.

The election accounts of members returned to Parliament are obliged to be audited.

Railway companies appoint two auditors of accounts. The law courts in Scotland have an auditor of the agent's accounts of costs subject to review of the courts. In all sheriff courts the taxation of accounts is regulated by Act of Sederunt 1839, s. 109.

AUDITORY NERVE, the special nerve of hearing. The right and left auditory nerves form the eighth pair of nerves (counting from the front) which leave the brain, the nerves of smell being the first, and those of sight being the second pair. The auditory nerve and the seventh pair (the facial nerve, governing the muscles of the face, including the ear itself) leave the brain together, and hence are reckoned as one, in a most confusing manner, by some English anatomists; but since the nerves are quite distinct (one being comparatively hard, small, and round, and the other, the auditory, being comparatively soft, large, and flat) there seems no defence for this proceeding, and it is abandoned on the Continent as well as by leading physiologists in England, such as Professors Huxley, Foster, &c. It is necessary, therefore, to understand that the auditory nerve may be called the *portio mollis* of the seventh pair, at the same time that it is truly the eighth pair with perfectly separate function, existence, path (after the first issue from the brain), and origin. It arises from the floor of the fourth ventricle of the brain, and from the restiform body, around which it winds to join the facial nerve, its temporary companion. The deep origin of the auditory nerve is partly from the auditory nucleus in the floor of the fourth ventricle of the brain, and partly from the posterior pyramid of the MEDULLA OBLONGATA. See also BRAIN, NERVOUS SYSTEM.

The auditory nerve is what is called an *afferent* nerve; that is, it receives sensations and conveys them to the brain, but does not in return carry back the brain's orders

to any set of muscles, as is the office of its companion at starting, the facial nerve, for instance. The auditory nerve passes forward into the petrous portion of the temporal bone, in which is the "bony labyrinth" of the internal ear, deeply imbedded; and here it divides, supplying with one branch the semicircular canals, and with the other the cochlea. This is not the place to describe the ear, which will be done in the article *EAR*, but it may be mentioned that the specially musical part of hearing, that by which we distinguish a high note from a low one, or a fiddle from a flute, is the office of the cochlear part of the nerve; whilst the vestibular part, getting its stimulus from the semicircular canals, accounts for the direction of the sound and for all characters of sound other than the purely musical. But this latter part of the auditory nerve has, in addition to hearing, a most important function. This has been best set forth by M. Cyon in his brilliant thesis for his doctor's degree, delivered at Paris in 1878, and is fully discussed by Professor Foster in his authoritative "Physiology" (London, 1879). M. Cyon, in a remarkable series of experiments, shows that the semicircular canals of the ear, which are all at right angles to each other, are the means whereby the equilibrium of the body is maintained. The position of these canals will be shown in *EAR*, but it may be roughly indicated by imagining a half-hoop lying on the ground, and two others standing on their points vertically, whereof one is directed north and south and the other east and west, and the points of all three half-hoops are to be connected by a vestibule. This arrangement being on both sides of the head, the least pressure on the walls of the canals by the fluid which they contain would be felt, and such a pressure would be caused by any movement of the head in space, and would affect differently each of the three canals, clearly indicating its direction. Mr. Cron Brown has pointed out that if we are placed on a smoothly rotating table, with our eyes shut, we can pronounce with certainty how much we turn, and whether it is to right or to left. Yet sight and feeling are here no guide. M. Cyon's experiments leave no doubt that the mysterious "sense of equilibrium" resides in the semicircular canals of the ear. If these are destroyed the power of balancing is gone. Truly, this organ is amongst the most amazingly wonderful things in a universe of wonders.

AUDRAN, GERARD. This eminent engraver was born at Lyons in 1640. At an early age he went to Paris, where his talents soon obtained notice, and procured him eventually the patronage of Le Brun, the king's painter, who employed him to engrave the "Defeat of Maxentius" and the "Triumph of Constantine." He went subsequently to Rome, where he improved himself in design in the school of Carlo Maratti. Among many fine plates which he executed at this period, a portrait of Pope Clement IX. excited particular admiration. On his return to France he was appointed engraver to the king, and in the year 1681 was nominated councillor of the Royal Academy. He died at Paris in 1703, aged sixty-three. Gerard Audran was unquestionably one of the greatest historical engravers that has ever existed. His reputation perhaps rests chiefly on the celebrated series of plates after Le Brun's Battles of Alexander. His style is composed of a bold mixture of free hatchings and dots, placed together apparently without order, but rendering with admirable effect not merely the contours, but the mind and feeling of the painter.

AU'DUBON, JOHN JAMES, the distinguished ornithologist, was born in 1780. He was the son of a French admiral in Louisiana, and was taken to France at an early age for the purpose of giving him the full benefit of a European education. At the age of seventeen he returned from France, which was then still in the throes of the great Revolution, and in the sylvan retreats of the New World he began his great collection of drawings, under the

title of the "Birds of America." After his collection had multiplied upon his hands, he undertook, in 1824, a journey to Europe, with the view of obtaining subscribers to his great work. He was everywhere cordially received. On the Continent Cuvier, Humboldt, and Herschel gave him a hearty welcome; and in Edinburgh he was warmly patronized by Sir Walter Scott, Lord Jeffrey, Sir David Brewster, and Professor Wilson. The work which he was thus enabled to publish is considered as one of our first authorities in ornithological science. On his return to America he brought out a work on animals similar to that on birds, which is highly esteemed by all lovers of natural history. In the pursuit of his favourite studies as a naturalist he followed the objects of his research into their favourite haunts, and painted them from nature; sometimes spending years away from his family and connections. It was thus that the life-like fidelity and beauty of his delineations raised him to the first rank as an artist, whilst his minute accuracy in describing their habits proved him to have been a close observer of nature. He died in 1851, full of years and honours. His "Life and Adventures," edited, from materials supplied by his widow, by Robert Buchanan, was published in 1868.

AUERBACH, BERTHOLD, perhaps the greatest novelist of Germany, was born at Nordstetten in the Black Forest in 1812, and died at Cannes on 8th February, 1882. Of Hebrew extraction, he had been destined for the synagogue; a theology which he mentally outgrew was, however, soon abandoned. Yet his studies bore fruit in his first literary venture, a novel founded upon the life of the great Jewish philosopher Spinoza, a biographical romance, full of interesting pictures of the social and religious manners of the Jews. Of this book a translation, sanctioned by the author, appeared in this country just before his death. It was one of the last things to give him pleasure, for his early literary child was also a favourite. It was followed, in 1841, by a complete translation, in five volumes, of the works of Spinoza. Besides this Auerbach wrote some miscellaneous works, bearing more or less directly upon politics. In these he revealed the love of justice and humanity, the revolt against all oppression, against all that is calculated to restrict the freedom of the individual, that distinguished him through life, and which gave to his writings an ethical value calculated to help his overgoverned countrymen to a truer comprehension of that much abused word *liberty*. A patriot in the best sense of the word, Auerbach never let himself be entirely dazzled by the military triumphs of Germany. Fired with the desire to tear the delusive veil from his countrymen's eyes, he wrote the series of novellettes that established his fame. We refer to his village tales ("Dorfgeschichten"), most of which have been translated into English, though unhappily not well. Indeed, few German authors have more right than Auerbach to exclaim, "Traduttore, traditore." It is true that Auerbach's peasants are often philosophers in disguise, never, indeed, genuine bores; but with all defects these celebrated stories furnish (for those who can read German) most charming glimpses into the life of the Black Forest, and in the main most natural and true. His later works, though more elaborate and pretentious, do not bear comparison with the "Dorfgeschichten."

AUERSTADT, a village in the department of Meuseburg, in the kingdom of Prussia, near which the main body of the Prussian army, commanded by the Duke of Brunswick, was defeated by the French at the battle of Jena, 14th October, 1806. The French were commanded by Marshal Davoust, afterwards Duke of Auerstadt. A monument marks the spot where the Duke of Brunswick was wounded.

AUGEREAU, PIERRE FRANÇOIS CHARLES, Duke of Castiglione and Marshal of France, was born of

humble parents in 1757. He first enlisted in the French carabiniers, and from thence entered the Neapolitan service. He obtained his discharge in 1787, but continued to reside at Naples. When the French settlers were expelled from Italy in 1792, Augereau volunteered into the revolutionary armies of his country, and joined that which was intended to repel the Spaniards. He rose rapidly to the command of a division in association with Bonaparte. It was under Augereau that the French carried the passes of Millesimo in the spring of 1796. At Dego he rendered eminent service; and again, it was Augereau's brigade, with himself at its head, that rushed upon the bridge of Lodi, and finally carried it in the teeth of the enemy's batteries. His services were in constant demand through the whole of the revolutionary war, and he distinguished himself particularly at Castiglione, whence he subsequently took his title. In 1797 he sided with Barras and the Directorate, and by him the coup d'état, or revolution of Fructidor, was effected. Augereau, however, seems to have been always suspicious of the true republicanism of Bonaparte, and with too much justice, as the event proved; probably also he was jealous of the younger man and soldier, whose rising reputation was threatening to obscure his own. This Bonaparte knew and felt, and on the 18th Brumaire, Bernadotte and Augereau were the only generals whom he dared not to summon to his side. When the revolution was completed, Augereau submitted with the rest, but Bonaparte still distrusted him, and he had no important command until 1805, when, with the new dignity of marshal, he led the division of the Great Army which reduced the Voralberg. In 1806 he was engaged in the battle of Jena, and commanded the division which subsequently took possession of Berlin. At the battle of Eylau, ill with fever, Augereau caused himself to be tied upon his horse, and remained to the last in the action, though wounded. In 1809 and 1810 he commanded in Catalonia, where he showed but little mercy to the Spaniards. In 1813 he took part in the campaign of Saxony, and made a valiant stand near Leipzig. In 1814 he was intrusted by Napoleon with the defence of the south-east of France against the Austrians, when he occupied Lyons and organized its defence; but at length retired to the south, where he made his peace with the Bourbons, and was confirmed in his dignity. On the return of Napoleon in 1815 he kept aloof. Augereau was one of the council to try Marshal Ney. He died in 1816.

AUGITE, a mineral which occupies an important place in chemical and mineralogical systems. Werner divided a large class of minerals, occurring commonly in basalt, lavas, and other volcanic rocks, into two species, to which he applied the names of *augite* and *hornblende*. This division was founded on the difference existing between the crystallized forms and structure. The same division was shortly after adopted by Haüy, who applied to them the names of *pyroxene* and *amphibole*, and gave the measurements, determining the oblique rhombic prisms, with the most general modifications characteristic of either species. Berzelius viewed the augites as composed of one equivalent of bisilicate of lime, united with one of the bisilicate of magnesia.

Taking the double bisilicate as a basis, many species are produced by substituting either protoxide of iron or protoxide of manganese for either of the two bisilicates. Such are the following:—*Diopside*, a pale-green crystal, with a vitreous lustre, a specific gravity of 3.299, and a tendency to melt before the blowpipe into a colourless semitransparent glass; *hedenbergite*, a dark-green mineral, having less silica, lime, and magnesia, but more iron than diopside; *diallage*, a crystal of a bronze yellow colour, a mother-of-pearl lustre, and a very perfect cleavage; its chemical constitution differs greatly in different specimens; *hypersthene* is very similar in appearance and character to diallage; *sahlite*,

a mineral whose chemical constitution might be indicated by supposing one equivalent of hedenbergite to be combined with two of diopside.

Mineralogists have discussed at much length the connection between augite and hornblende, and their probable formation. Mitscherlich observed that at many foundries in Sweden and Germany the scoræ possessed the form, structure, and chemical composition of certain minerals found in nature. From this source he obtained upwards of forty-two varieties; and among these specimens possessing the form and structure of augite are frequently found, whereas hornblende has never been discovered. Other investigations have led to the opinion that augite is formed whenever the process of cooling, and consequently of crystallization, is rapid; and hornblende, when it is conducted more slowly—the chemical ingredients being in both cases nearly the same. Augite is found at Arthur's Seat, Edinburgh; at Portrush, Antrim; in Auvergne, Bohemia, and other volcanic districts, both active and inactive.

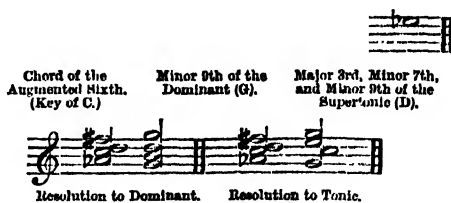
AUGMENTATION, a musical device of great majesty of effect, consisting in the introduction of the subject of a fugue, or piece in "imitation," in notes of double the original length, or sometimes in notes of quadruple the original, thus:—



AUGMENTATION, PROCESS OF, in Scotch law, is an action brought by a parish minister into the Court of Teinds against the heritors, for an increase of stipend, on the grounds of increase of population in the parish, increased cost of living, &c. The decree includes the allotment of proportions of the stipend amongst the proprietors, called "a scheme of locality." Once settled no further action can be brought for twenty years.

AUGMENTED SIXTH, CHORD OF THE, one of the most beautiful chords in modern music, deriving much of its striking effect from the circumstance that it arises from two roots, and hence is susceptible of a variety of resolutions, according as one or the other root is held to be the principal. It consists of the minor 9th of the dominant of any key-note, with the major 3rd and the minor 7th of the supertonic of the same key-note. To these notes may be added either the supertonic itself or its minor 9th, but of course not both together. The dominant, for a like reason, never appears.

The notes of the augmented sixth might be described, with regard to the key-note, as its minor 6th, the key-note itself, either its 2nd or its minor 3rd, and its augmented 4th. We append the chord in its usual position in the key of C major, showing its roots and its two most usual resolutions:—



The most usual resolutions of the augmented sixth are upon the common chord of the dominant, or on that of the

key-note. The notes forming the interval which gives the chord its name are the minor 9th of the dominant and the major 3rd of the supertonic; and these are rarely inverted so as to make a diminished 3rd, though a successful instance of the employment of this difficult form of the chord is found in Barnby's well-known part-song, "Sweet and Low." The other notes of the chord may be placed in any position.

A chord of the augmented sixth, of similar construction, is sometimes taken on the minor 2nd of the key, but it is difficult to manage except in major keys.

AUGSBURG, the capital of the circle of Swabia and Neuburg, in Bavaria, stands on the Wertach and the Lech, which unite in the town. It is 86 miles N.W. of Munich by the railway from Munich to Leipzig. The city is divided into the upper, centre, and lower towns, and the suburb of St. James; it is intersected by four canals, which supply the mills and manufactures with water. The exterior boundary of the glacis has been converted into delightful walks. Many of the streets are narrow and irregularly built, but Maximilian Strasse is remarkable for its breadth and architectural magnificence. The general appearance of the town is, however, much improved by a variety of handsome buildings and squares, and enlivened by the manner in which the generality of the houses are painted with stripes, either green, red, or yellow—always separated by white. Every street and lane is provided with reservoirs of water for the use of the adjoining houses.

The principal public buildings are—the town-hall (rathaus), which is one of the finest in Germany. It contains the golden hall, 110 feet long, 58 broad, and 52 high: this splendid apartment, with four others adjoining, is used as a picture gallery; the "Perlach Tower," which is ascended by a staircase of 500 steps; the bishop's palace, now used as government offices, in the hall of which Luther presented the Confession of Augsburg to Charles V. in 1530; the "Halle," a handsome commercial mart and storehouse; the arsenal, which has a finely embellished façade; the public library, which is rich in Greek books and manuscripts; the Academy and School of Art; the Gothic cathedral, which was originally a Romanesque basilica, begun in 995, consecrated in 1006, and altered in 1321, 1431. It is 350 feet long; its main aisle is 45 feet wide, and the side aisles are fitted up with twenty-four chapels, adorned with fine pictures. There is a side door of bronze, carved with figures and emblems of the date of the year 1048. St. Ulrich's Church is 310 feet long and 94 wide; from the steeple, which is 350 feet high, there is a fine view of the town and environs. Augsburg contains altogether about fifteen churches, five of which are Protestant, and a great number of richly endowed charitable institutions, the most important of which is that called the "Fuggerei," established in 1519. [See FUGGER.] Among its literary and scientific establishments may be named the gymnasium, the seminary, the royal polytechnic school, the school of design, the institution for deaf-mutes, and the historical society. There are a great number of schools for the education of youth, a well-conducted orphan asylum, and two endowed schools.

Augsburg is the principal seat of commerce of South Germany, and of commercial transactions with the south of Europe. It has large banking and exchange operations, and a very extensive transit of merchandise. It is a staple town also for the deposit and sale of the wines of Italy, Switzerland, and the south of Germany, and has excellent railway accommodation. It is famous for its plate, jewellery, timepieces, philosophical and mathematical instruments, books, prints, maps, linen, cotton and woollen manufactures, leather, and other products. The *Allgemeine Zeitung* ("Universal Newspaper"), which circulates in most parts of Europe, is printed and published in Augsburg, and is hence often called the *Augsburg Gazette*. The population in 1880 was 61,408.

The Emperor Augustus planted a colony here about 12 B.C., to which he gave the name of *Augusta*, or distinctively, *Augusta Vindelicorum*, and hence comes the name of Augsburg. In the fifth century it was pillaged by the Huns; it afterwards came under the dominion of the Frankish monarchy, upon the dissolution of which it fell under the sway of the dukes of Swabia; but, growing rich by its commerce and manufactures, it gradually shook off all external authority, purchased its independence of its episcopal sovereigns, was recognized as a free state by the German emperors, and retained its rank as a free imperial city for upwards of 500 years—namely, from 1276 to 1806. In the seventeenth century the rise of Frankfort-on-the-Main inflicted a blow on the prosperity of the town from which it has never recovered. Augsburg indeed has become a place of less importance in the circulation of exchange in Europe, and Frankfort is now the chief money-market of central Germany. Under the settlement of Germany, in 1802, Augsburg was recognized as one of the six Hanse towns which were declared independent of the German empire; but three years afterwards it was merged into the dominions of Bavaria, under the treaty of Presburg; and in March, 1806, it was accordingly surrendered into his Bavarian Majesty's hands by the French general Réné, acting under the orders of Napoleon Bonaparte.

AUGSBURG, CONFESSION OF, the name given to the profession of faith of the Protestant Lutheran Church, which was drawn up by Melancthon, with Luther's approbation, in order to be laid before the Emperor Charles V. at the great diet held at Augsburg in June, 1530. The Confession was immediately afterwards printed, and, being translated into various languages, was spread over Europe, and was regarded as the rule of the Lutheran Church in matters of faith. It consists of twenty-eight articles, twenty-one of which state the belief of the Lutherans on the principal tenets of religion; and the other seven consist of refutations of certain points either of dogma or discipline maintained by the Roman Catholic Church, on account of which the Lutherans separated from the communion of Rome. Melancthon, while drawing up the Confession, had frequent conferences with Luther, who was then staying at Coburg, not far from Augsburg. Ten years afterwards Melancthon, who had not regarded the Confession as binding, published a Latin edition, in which he introduced some important variations and additions, with a view to conciliation, serious differences having arisen between the Lutherans and Calvinists on the doctrine of the Lord's Supper. These variations were fiercely repudiated by the Lutherans, and they gave rise to much controversy between the Lutheran and Reformed Churches of Germany, adherence to the altered or unaltered Confession being generally the chief point of distinction between them.

Though still formally recognized the Confession no longer expresses the theological views of the Protestant churches of Germany, which, since its composition, have made great advances in the scientific study of theology and ecclesiastical history, and also in the critical examination of the Old and New Testaments. Ernest Solomon Cyprian has written a good history of the Augsburg Confession, and Webber a "Critical History" of the same (Frankfort, 1783). (Schröckh's "Kirchengeschichte," Mosheim's "Ecclesiastical History," and Köllner's "Symbolik der Lutherischen Kirche," Hamburg, 1837.)

AUGUR. The early inhabitants of Italy, like all rude nations, imagined that they saw in every unusual occurrence a manifestation of the will of Heaven. The power of interpreting these signs was thought to depend upon a peculiar talent conferred upon the favoured mortal from his birth, but a certain discipline was necessary to its full development. A superstition so deeply seated in the minds of the people was turned to account in the political consti-

tation of Rome, by the establishment of a college of augurs, whose duty it was on all occasions of importance, by certain arts, to ascertain and report the pleasure or displeasure of the gods. ROMULUS himself was said to have been skilled in the arts of divination, and at the foundation of the city the claims of the rival brothers Romulus and Remus were decided by augury. [See also TARQUINIUS PRISCUS, ARTUS NAPTUS, &c., for the power of the augurs in early Rome.]

The institution of the college of augurs may be referred to the earliest period of Roman history. Romulus was sole augur, with three assistant augurs; Numa, adding two principal augurs, raised the number to three, without assistants. Each of the three original Roman tribes had one augur. By the time of the Ogulnian law, which was passed B.C. 307, and opened the pontifical and the augural colleges to the plebeians, there were already four augurs. This law associated five plebeians with four patricians, at which number they remained to the time of Sulla, B.C. 81, who increased them to fifteen. Cæsar made the number sixteen, and among the extraordinary powers conferred upon Augustus in B.C. 29 was the right of electing augurs at his pleasure, whether there was a vacancy or not. From that time the number of the college ceased to be definite.

At first the augurs, like the other priests, were elected by the Comitia Curiata; but as early as the year B.C. 452 it was the practice of the college to fill up vacancies by co-optation, and this mode of election continued to the third consulship of Marius, B.C. 103, when the election was again given to the tribes. The return of Sulla to power restored the election to the college itself; but in the consulship of Cicero (B.C. 63) T. Attius Labienus, with the support of Cæsar, procured the reversal of Sulla's law. After the death of Cæsar, M. Antonius restored the old law of co-optation in the election of the chief pontiff, and therefore, most probably, in that of the other priests also.

The ceremonies and superstitions which constituted the supposed science of the augurs would be tedious to enumerate; but that which especially characterized the augural office was the pretended power of ascertaining the divine will from the flight of birds. So prominent a place did the birds hold as the interpreters of the divine will that *augur*, the Latin for bird, is the chief element in the term *augur*, as it is also in the equivalent word *auspex* (*arispez*), that is, bird-observer.

The birds were observed by their song and by their flight. The eagle was the most honourable, and the right side generally the most favourable. But this differed for different birds; thus a crow gave a favourable augury when it cawed on the left. Also, the feeding of the sacred chickens was a test in high favour (*ex tripudius*); if they ate greedily of the sacred cake or corn, well; better still if they dropped some from their beaks; but worse impending if they refused to eat. Thunder and lightning also gave auguries, the preparations for taking which were very curious and formal. Absurd as all this system of augury appears, the political power of the augurs was substantial. The election of a king, a consul, a dictator, a prætor, a curule ædile, of the various priests, pontifex, augur, vestal, flamen, &c., all were void unless the auspices were favourable. The auspices were formally taken by the chief magistrates only, but as the interpretation was in the hands of the augurs the latter exercised the real power in the matter. A general could not cross the frontier of the state or even a river without the sanction of his birds. To engage an enemy in defiance of these interpreters of the will of Heaven was sure to entail present or future defeat. In the assignment of public lands the science of the augur was required to mark out the different allotments. These are a few out of many instances. A man once created an augur was an augur for life. That the augurs received money in some shape from the public treasury is positively stated; and the public

money may perhaps be traced in the dinners given by the augurs on their election, which were celebrated in the annals of Roman gastronomy. In the latter years of the republic many of the duties of the augurs were performed in the most lax manner. At the inauguration of a magistrate, says Dionysius (ii. 6), speaking of his own time, the ceremony is a mere shadow of what it was. The candidate takes his seat, rises, repeats a set prayer in the open air, an augur then declares he hears thunder on the left, when in fact there is none, and the candidate forthwith enters upon his magistracy.

The reader desirous of further information on this curious subject may refer to Cicero (himself an augur), "De Republica," "Contra Leg. Agr.," "Ad Fam.," &c.; to Livy, iii., &c.; to Dion, xli., xlv., &c.; to Pliny's Epistles and "Nat. Hist.," and in fact so closely interwoven with the national life of the Romans was this pretended science, credible enough to them, that it is almost impossible to consult any distinguished Latin author without finding references or allusions to it.

AUGUST. The month of August was originally called Sextilis, being the sixth month in the Latin calendar, which began with March. After Numa's reform, however, it held only the eighth place in the series of months. In the first calendar Sextilis consisted of twenty-eight days; in that of Romulus, of thirty; Numa reduced the number to twenty-nine; Julius Cæsar restored it to thirty; and Augustus Cæsar, from whom it derived its new name, extended the number of days to thirty-one, which has continued ever since. It seems almost surprising that Augustus did not rather choose September as his month, since it was in that month that he was born. However, the desire to come next his uncle Julius in the year, led him to prefer the month next following July, which had been so named afresh after the great Dictator; and, besides, Sextilis had always been a very lucky month with Augustus.

AUGUSTA. This title was first given to his wife Livia after the death of Augustus, according to the will of the emperor (Tac. "Ann." i. 8). It was afterwards conferred by Claudius on his wife Agrippina (A.D. 51), and by Nero on his wife Poppæa (A.D. 64). Eventually it became a common title of the mother, wife, sister, or daughter of an emperor. See AUGUSTUS.

AUGUSTA. This name was also frequently adopted by towns, sometimes in place of, sometimes in addition to the previous name; also many new colonies received it. Thus we find Augusta in the country of the Salassi, now Aosta; Augusta Taurinorum, now Turin; Augusta Rauracorum, now Augst near Basle; Augusta Vindeborum, now Angsburg, sometimes written Augstburg; Cæsar-Augusta, now Saragossa. Nearly similar to these is Augusto-dunum, formerly Bibracte, the capital of the Ædui, now Autun. In other towns it has disappeared, as in Augusta Asturica, now Astorga. Many Greek cities received the equivalent Greek name Sebaste. One of these, Sebaste or Sebastia, on the upper stream of the Halys, is still called Sivas.

AUGUSTA, a town in the State of Georgia, North America, on the S.W. bank of the river Savannah, 120 miles N.N.W. from its mouth. The houses are mostly of brick, and spacious; and the streets wide, straight, and ornamented with trees. There are a city-hall, court-house, gaol, theatre, hospital, medical college, masonic hall, and several churches. It is situated in a good cotton district, has a very active trade, and sends a large quantity of cotton, tobacco, and other produce down the river to Savannah. It is connected with Charleston and Milledgeville by railway, and communicates daily with Savannah by steamboats. The population in 1880 was 21,891.

AUGUSTA, a town in the United States of North America, the capital of the State of Maine, is situated on both sides of the river Kennebec, 43 miles from the sea.

The population in 1880 was 8,665. A handsome bridge, 520 feet long, across the Kennebec, connects the two parts of the town. The ground rises from each side of the river, and the streets are regularly laid out. The town contains a state-house, court-house, arsenal, hospital for the insane, academy, high school, and several places of public worship. The state-house is a fine building of white granite, on an eminence half a mile from the town. There is a dam across the Kennebec, half a mile above the town, with locks to facilitate navigation. By means of it the navigation of the river north of Augusta has been made easy, and great hydraulic power has been treated for manufacturing purposes. All the business part of the town was burned down in 1865, but has since been rebuilt.

AUGUSTI, CHRISTIAN JOHANN WILHELM, one of the most voluminous theological writers of Germany, lived 1771 to 1841. He was originally led by the influence of Griesbach to join the critical or philosophical school of theology, but during the last forty years of his life he was a zealous advocate of the established form of religion, without being bigoted. As far as his doctrines go, he may be considered an orthodox Lutheran. In 1803 he was Oriental professor and in 1807 theological professor at Jena, which he left for Breslau in 1811, and finally for Bonn in 1819. His writings, most of which are of an historical or archaeological nature, are very useful as works of reference; but they are deficient in elegance and simplicity of form, and contain more evidence of learning and industry than of the true spirit of an historian.

AUGUSTINE, ST. (AURELIUS AUGUSTINUS), the most eminent of the Latin fathers, and one of the greatest of theologians, was born on the 13th of November in the year 354, at Tagaste, a small town of Africa in the inland part of Numidia. His father Patricius was a man of good family, and filled the office of magistrate, but did not become a Christian until nearly the close of his life. Monica, the mother of Augustine, was the child of Christian parents, and remarkable for her gentleness, affection, and piety. His father was anxious to give Augustine a good education, and accordingly sent him to school at Madura (the birthplace of APULEIUS), and afterwards when he reached the age of seventeen to Carthage. Here Augustine yielded to the temptations of the place, then notorious for its sensuality and corruption, and before he reached the age of eighteen he became the father of a natural son, whom he named Adeodatus, and who was afterwards baptized with him at Milan. He still pursued his studies, however, with vigour, and becoming a proselyte of the MANICHEANS, he zealously defended their opinions. He acquired fame as an orator, and taught rhetoric successively at Tagaste, Carthage, Rome, and Milan. At the last-named place he made the acquaintance of St. Ambrose, bishop of that city, a man eminent alike for his piety and eloquence, who received him with great kindness, and whose teachings awakened still more his already great desire for religious knowledge. He abandoned Manichæism and took up the study of the Platonic philosophy, but still failing to find rest he undertook an earnest study of the Scriptures, and especially of the writings of St. Paul. The result was that after many struggles he resolved to publicly profess himself a Christian, and he was baptized by St. Ambrose on the 25th April, A.D. 387, a fellow-townsmen and friend, named Alypius, and his natural son Adeodatus being baptized with him. His mother Monica was present at the ceremony, having hastened from Africa for that purpose, full of joy at this long-delayed result of her prayers and instructions. He now renounced his rhetorical pursuits, and devoted himself to the study of the gospel, sold the remains of his property, gave the proceeds to the poor, and devoted the next three years to monastic retirement and study in company with a few friends of like mind with himself. In 391, being at Hippo on a visit to a Christian

friend, he was, much against his own inclination, elected a presbyter, and in 395 he became condutor to Valerius, the bishop of that place, whom he succeeded as bishop in 396.

From this time his history and writings are closely associated with the DONATIST and PELAGIAN controversies, in which he took the main part on the orthodox side, and developed that system of theology identified with his name, which has so largely moulded the thought of the western world, and which forms the backbone of the various systems of Calvinistic doctrine. Though not always consistent with himself, the main points of his teaching have been fairly summarized as follows:—"By the sin of Adam human nature became physically and morally corrupt. From it evil lust has come, which, while it has become the inheritance of all men by generation, has risen to original sin, in itself damnable, and prevails so much over the will of the natural man that he can no longer will what is good, as he should do, out of love to God, but sins continually, as his actions may also externally show. From this corrupt mass of humanity God resolved from eternity to save some through Christ, and to consign the rest to deserved perdition. Though baptism procures forgiveness of sin, even of original sin, it does not remove the moral corruption of man. Therefore, divine grace, alone and irresistibly, works faith in the elect, as well as love and power to do good. Those to whom the grace of God is not imparted have no advantage from Christ, and fall into condemnation, even an eternal one." These doctrines he defended with great vigour, immense resource, and a perfect willingness to follow them to every legitimate issue; thus he detected the presence of original sin in two babes striving for the breast. Severe and unsparing as a controversialist, he was yet in general respectful and kind in his treatment of his opponents personally. The only exception to this is found in his acquiescence in the persecution of the Donatists, thus unhappily giving the sanction of his name to the pernicious practice of punishing differences of religion by civil penalties. Augustine held his place as bishop of Hippo till the year 430, when he died, in the seventy-sixth year of his age, during a siege of the city by the Vandals under Genserius. It was taken the year following, but the Vandals respected the library and the grave of the bishop.

He left behind a vast mass of writings, of which the greater part remain. The most important of these are his "Confessions," which contain a history of the earlier period of his life, interspersed with reflections and addresses to God, which display the most profound thought, combined with the deepest reverence and devotion; the "De Civitate Dei," commenced in 413 and finished in 426; and his "Retractationes," published in 528.

"The fame of Augustine, bishop of Hippo," says Mosheim, "filled the whole Christian world, and not without reason, as a variety of great and shining qualities were united in the character of that illustrious man. A sublime genius, an uninterrupted and zealous pursuit of truth, an indefatigable application, an invincible patience, a sincere piety, and a subtle and lively wit, conspired to establish his fame upon the most lasting foundations. It is, however, certain that the accuracy and solidity of his judgment were by no means proportionable to the eminent talents now mentioned; and that upon many occasions he was more guided by the violent impulse of a warm imagination than by the cool dictates of reason and prudence. Hence that ambiguity which appears in his writings, and which has sometimes rendered the most attentive readers uncertain with respect to his real sentiments; and hence also the just complaints which many have made of the contradictions that are so frequent in his works, and of the levity and precipitation with which he set himself to write upon a variety of subjects, before he had examined them with a sufficient degree of attention and diligence."

St. Augustine's works have been printed in a collected

form repeatedly: at Paris, 1532; by Erasmus, from Frobenius' press, 1540-43; and most completely by the Benedictines of St. Maur (Paris, 1679). Some of St. Augustine's works are among the earliest specimens of typography. The "*Liber de Arte Prædicandi*" was printed by Fust at Mentz, in folio, before 1466, and another edition appeared in that year from the press of Mentelin.

An account of his life and controversies fills the 13th volume of the "*Mémoires pour servir à l'Histoire Ecclésiastique*," by M. Lenain de Tillemont, 4to (Paris, 1702); and a good English translation of the chief works is to be found in Parker's "*Fathers of the Holy Catholic Church*."

AUGUSTINE, ST., the first Archbishop of Canterbury, was sent by Pope Gregory the Great, in 597, to reconvert England to the Christian faith, utterly crushed out by the Saxon conquest. The pope, when but a young deacon, had noted certain slaves in the market place of Rome, and asked them whence they came, so fair of skin, so golden of hair. "They are Angli" (Angles), he was told. "Non Angli sed angeli," replied Gregory (they are not Angles but angels, with faces and forms like that). When he learnt further that they came from Deira, the great midland kingdom of Britain, he went on in his punning fashion, which only disguised a stern purpose—"De ira" (from wrath), said he; "ay truly, plucked from God's wrath, and called to Christ's mercy. Ella is their king, and Alle-luia shall be sung in their land." Many years after (in 590) Gregory came to be pope. The time offered nothing, but he had never forgotten his interview with the Angle slaves; and when he heard of the marriage of the Christian princess Bereta, daughter of the King of the Franks, with the Anglo-Saxon heathen king of Kent, Æthelberht (Ethelbert), he seized the opportunity and at once despatched Augustine, a Roman abbot, at the head of a band of monks, to preach the gospel to the English under favour of their new queen. The missionaries landed in 597 on the very spot where Heugst had landed a century and a half before; and Æthelberht received them kindly for love of his queen, and assigned them the ruined British Christian church of St. Martin at Canterbury for their worship. This venerable monument still exists. The king himself refused to forsake the gods of his fathers, but he gave full shelter and protection to the strangers.

The civilization, art, letters, which had fled before the Anglo-Saxon conquest, returned with the Christian faith. The conquest of Britain by the Anglo-Saxons had driven a wedge of heathendom into the heart of the Catholic faith—on the one side lay Ireland, on the other Gaul, Spain, Italy. Roman culture, worship, and science were rooted out in that strange conflict to the death which depopulated the island, all except the fastnesses of the mountainous north and west, and filled the desert made by fire and sword, with a race entirely new. Now a more peaceful conquest began. The Kentish king's daughter was married to the powerful King of Northumbria, and with her went Paulinus, one of St. Augustine's monks, whose tall stooping form, slender aquiline nose, and black hair falling round a thin worn face, were long remembered in the north. Eadwine the king (the founder of Eadwine's burgh, known to us as Edinburgh) was soon converted, and at a great witenagemot his chiefs agreed to follow him in his change of religion. But when Æthelberht died and Eadwine was killed in battle with Penda, the foremost champion of heathendom, Paulinus fled, and the Christian cause shrank almost into nothingness. It might have perished once more had not the new king of Northumbria, Oswald, called to him the good Irish monks of Iona who had befriended him in his youth, and thus replaced Paulinus. It was the Irish Church which sustained the hard fight in North Britain until Wilfrith of York and Benedict Biscop of Wearmouth regained for Rome the authority so many years wielded by the Irish abbot of Iona.

At the synod of Whitby, in 664, Oswi the king decided for Rome, and Archbishop Theodore was sent to Canterbury by the pope to organize the newly pledged obedience and complete the work of Augustine.

Augustine himself had made an attempt to establish a uniformity of discipline and customs in the island; and, as a necessary step, to gain over the British bishops of Wales. For this purpose a conference was held in Worcester-shire, at a place since called Augustine's Oak, where the archbishop endeavoured to persuade the British prelates to make one communion, and assist in preaching to the unconverted Saxons. But neither this nor a second conference was successful; and Augustine is said to have threatened the Britons with a terrible calamity, as a punishment of their disobedience, which was considered to have fallen upon them in the shape of the war, A.D. 613, after Augustine's death, when Æthelfrith, king of Northumberland, marched with an army to Caerleon, and when nearly 1200 monks of Bangor were put to the sword.

In the year 604 Augustine consecrated two of his companions, Mellitus and Justus, the former to the see of London, the latter to that of Rochester. In the same year he died at Canterbury, and was buried in the churchyard of the monastery (founded by Æthelberht) which went by his name, the cathedral being not then finished. After the consecration of that church, his body was taken up and deposited in the north porch, where it lay till A.D. 1091, when it was removed and placed in the church by Wido, abbot of Canterbury. Augustine is commemorated in the calendars of the English and Roman Churches.

AUGUSTIN'IANs, the name of some thirty religious orders in the Roman Catholic Church, among which may be mentioned—1. *The Canons regular of the order of St. Augustine, or Austin Canons*, founded or remodelled about the middle of the eleventh century. They were brought into England early in the century following, and had their first establishment at Colchester. They took their rule from the 109th epistle of St. Augustine. They acquired considerable influence, and had at one period about 170 houses in England and 25 in Scotland. Their discipline required the vows of chastity and poverty, but was less severe than that of many other monkish orders. Their habit was a long black cassock, having a white rochet over it covered by a black cloak and hood. 2. *The Hermits of St. Augustine, or Austin Friars*, a more austere order, were originally hermits, who renounced all property and lived upon the voluntary alms of the faithful. They were first congregated into one body by Pope Alexander IV. in 1256, who also imposed the observance of the canons of St. Augustine, and placed them under the orders of a general. Becoming in course of time corrupt and degenerate, new brotherhoods having stricter rules were introduced; and a very austere order was introduced about 1570, entitled the "Discaleceati," or bare-footed, from one of the rules which forbade the wearing of boots or shoes. The order remained until the period of the French Revolution, after which it was wholly suppressed in France, Spain, and Portugal, and reduced in South Germany, Austria, and Italy. It still retains some influence in Italy and South America. 3. *The Augustines*, an order of nuns claiming descent from a convent founded by Augustine himself. They wore a black habit until 1632, when the colour was changed to violet. They are vowed to the service of hospitals and the care of the sick.

AUGUSTULUS, the last Emperor of Rome. His name was Romulus Augustus, the diminutive being added by mockery. The great Augustus was the first emperor, the "little Augustus" was the last. The father of Augustulus (a Pannonian) was a favourite of Attila, and after the death of the "scourge of God" rose high in the favour of

the emperor Julius Nepos as a soldier. He used his position treacherously to drive his patron from the throne, and made Augustulus emperor in his stead. Within a year, however, ODOACER the barbarian overthrew him, and kept him the rest of his life at Naples in honourable captivity. ODOACER was the first barbarian king of Italy, and the date of his victory—that is, the extinction of the Roman Empire of the West—is given by Gibbon ("Decline and Fall") as A.D. 476.

AUGUSTUS is properly a title of honour, which was conferred upon C. Julius Cæsar Octavianus, the first emperor of Rome, and adopted by his successors. The meaning of the word seems to be "sacred," for it appears to be derived from *augur* [see AUGUR], the analogy between the two words being the same as that between *robur* (strength) and *robustus* (strong). The Greek writers interpreted the word by *sebastos* (admirable). But though the title was common to the emperors of Rome, it is in history generally limited to the first who held it, and is almost looked upon as his proper name.

AUGUSTUS, the first Roman emperor. His name was originally Caius Octavius, which he changed to Caius Julius Cæsar Octavianus, when he accepted the adoption of his great-uncle Cæsar, and thereby became a "Julius," or member of the famous Julian gens. Augustus was a title which the senate and people of Rome gave him in B.C. 27 to express their reverence for his power.

The father of Augustus was Caius Octavius, a senator and prætor of Rome, and his mother was the daughter of Julia Cæsar, sister of the great dictator. Julius Cæsar being thus, as stated above, the great-uncle of young Octavius, secretly determined (having no lawful children) to adopt him. To this end he, with his sister, the lad's grandmother, watched over his education with the greatest care.

Augustus was born in B.C. 63, and lost his father when he was only four years old. He went through the Spanish campaign in B.C. 45, and was studying military tactics at the camp at Apollonia, and learning Greek and philosophy under Apollodorus at the same time, when the news arrived of Cæsar's assassination. Undeterred by the fears of his stepfather, who was with him, he set out at once for Italy, and on landing at Brundisium with Agrippa and a few other friends found himself declared in Cæsar's will his adopted son and heir. He accepted the dangerous inheritance and took the name of C. Julius Cæsar Octavianus, which he ever afterwards retained. At first he only demanded the private property left him. He was suspected and watched by Mark Antony, who himself aimed at the supreme power, but succeeded so well in gaining the support of the senate and the soldiers that Antony became alarmed and withdrew to his province of Cisalpine Gaul. Octavian was appointed to the command of the senatorial army, pursued and defeated Antony, and drove him across the Alps. After this victory he marched on Rome and demanded and obtained the consulship at the head of his troops. On the return of Antony from Gaul with Lepidus he marched to their encounter, but almost at once entered into negotiation with them. The result was a division of the empire into three portions, Antony receiving Gaul, Lepidus Spain, and Octavian Sicily, Sardinia, and Africa. To secure their power they resolved on the slaughter of all who were likely to oppose them, and 300 senators (amongst them Cicero) and 2000 equites were massacred by their orders. Antony and Octavian now crossed into Greece against the self-styled Republican army. After the battle of Philippi, in which Brutus and Cassius were killed, and the hopes of the Republican party extinguished, a new division of the provinces was effected, Lepidus obtaining Africa, Antony taking the eastern half of the empire, and Octavian the western. Italy was excluded from the partition. Octavian was at first opposed by Sextus Pompey, who held command of Sicily; but in a successful sea battle Pompey

was defeated and driven into Asia. Octavian shortly afterwards took occasion upon a quarrel to deprive Lepidus of his province. There now remained but two masters of the world, and they divided the empire between them. To cement their friendship Antony had previously married Octavia, the sister of Octavian, but having neglected her for the fascinations of Cleopatra, war was declared against him by the Romans, and the struggle was brought to an issue at the naval battle of Actium, in the autumn of the year 31 B.C. Antony was completely defeated and fled to Egypt with Cleopatra, where, being pursued by Octavian, they both eventually committed suicide. Octavian, now sole master of the empire, returned to Rome, was honoured with three triumphs, and closing the temple of Janus, declared Rome to be at peace with the world, B.C. 29.

Having thus obtained supreme power, he determined to retain it by policy, and in this he was so skillful, and used the power he obtained to such good and useful purposes, that the Roman people gradually conferred upon him all the great offices of the state, until he possessed and exercised all the powers of the government at home and abroad. He frequently offered to lay down his power, as Sulla had done, but was as often prevailed to resume it. Thus he received successively the titles of Prince of the Senate, Imperator (that is, commander-in-chief, with power of life and death), Augustus (meaning sacred or consecrated), while he also enjoyed the perpetual proconsular power, the tribunitian power for life (which gave him authority to veto any law he chose), the office of perpetual censor (whereby he ruled the franchise), and that of pontifex maximus. Meanwhile the forms of the republic were always studiously kept up. [See EMPEROR.] It must also be added that he invariably used the power he acquired well. During the forty years of his comparatively peaceful reign he devoted himself to secure the welfare of the state and people of Rome. He gained victories in Asia, Spain, Pannonia, Dalmatia, Gaul, &c., but towards the close of his reign he was greatly afflicted by the defeat of Varus, whose legions were totally destroyed by the Germans.

His name is identified with triumphs in arts as well as in arms. He executed a number of most important public works, improved and beautified the city, so that it was said "he found it brick and left it marble," developed the commerce of the empire, which previously had been much neglected, and by his encouragement to literature and art gave a name, "the Augustan age," to the most splendid era of Roman letters.

His private life, however, was clouded by domestic unhappiness. He had no son, and his daughter Julia being detected in abandoned and criminal conduct, was condemned to banishment, B.C. 2. His adopted sons, with the exception of Tiberius, all died early, and these troubles preyed upon his mind. His health gave way, and to recruit his strength he undertook a journey to Campania, but his illness increasing he retired to Nola, where he died, A.D. 14, in the seventy-sixth year of his age.

Augustus had adopted Caius and Lucius Cæsar, sons of his only child Julia, by Agrippa. Both the emperor's grandsons died, and he was driven to adopt the young Tiberius Nero, son of the Empress Livia by her first husband, Tib. Claudius Nero, who indeed succeeded him.

In personal appearance he was rather below middle stature, but was well made. The expression of his face was that of unvarying tranquillity; his eyes were large, bright, and piercing; his hair light yellow in colour, and his nose somewhat aquiline. He was temperate even to abstinence in eating and drinking, was industrious and methodical in his habits, and was averse to all pomp and personal display. He was an author both of prose and verse, but only a few fragments of his writings remain.

By the Roman people he was held in the highest veneration, and after his death temples and altars were erected to

his memory, his name being reckoned among that of the gods.

AUGUSTUS I. (of Saxony) was the younger brother and successor (1553) of Maurice, who was made elector of Saxony through the influence of Charles V. His reign was on the whole peaceful and prosperous.

Augustus was intolerant towards the Calvinists; he banished them from his dominions, and caused a creed of Lutheran orthodoxy to be drawn up, styled "Formula Concordiæ," which was accepted by the three other Protestant electors of Germany. He died in 1586.

AUGUSTUS II. (of Poland), the Strong (in Saxon histories he is more generally styled Frederick Augustus I.), was the second son of John George III., elector of Saxony, and was born at Dresden in 1670. In 1694 he succeeded his elder brother, John George IV. Two years later the death of the heroic Sobieski left the throne of Poland open to the ambition of candidates, of whom there were several; but after many intrigues, in the early part of 1698 Augustus succeeded by sheer purchase in establishing himself as monarch of Poland. France and Sweden alone refused to recognize him.

The first aim of the new king was to keep his promise of recovering for Poland its lost possessions of Podolia, the Ukraine, and Kaminietz. War, conquest, the foundation of a great empire, and his own magnificence were the favourite dreams of Augustus. His alliance with Prussia enabled him, after a short war, to conclude the treaty of Carlowitz, by which most of the territories which he sought to recover were ceded to Poland.

This war being happily terminated, the allied monarchs proceeded to the completion of their projects against Sweden. This roused young CHARLES XII. of Sweden from the insignificance of youth, and excited at once the prince and his people to a pitch of heroism that rivalled, or even surpassed for a time, the glories of the great GUSTAVUS ADOLPHUS. Augustus was defeated in several engagements, and was at last forced to abdicate the crown of Poland in favour of Stanislaus, who had been selected for the office by the Swedish king.

The battle of Pultowa, and the overthrow of the power of Sweden in 1709, recalled Augustus to the throne of Poland. The pope released him from his oath of abdication. Russia, Prussia, and Denmark supported his pretensions, and Stanislaus fled.

The interval between 1718, the year of Charles XII.'s death, and that of Augustus, which took place in 1733, passed away without being marked by any remarkable incidents. The unsuccessful effort of Augustus to secure the duchy of Courland for his illegitimate son Maurice (the celebrated Comte de Saxe) was almost his only attempt at active policy. His reign altogether was most injurious both to Saxony and Poland. Utterly reckless in his ambition and in his love of pleasure, he squandered the resources of his subjects in the carrying out of his schemes of aggrandizement, or on his mistresses and illegitimate children. The latter are said to have been upwards of 350 in number. Many stories are told of his extraordinary physical strength, whence he derived his soubriquet of "the Strong."

AUGUSTUS III., son of Augustus II., elector of Saxony and king of Poland, was born at Dresden in 1696. The death of his father in 1733 made Augustus elector of Saxony, and left him at the same time the strongest pretensions to the throne of Poland. His indolent nature shrunk, it is said, from struggling to attain this uneasy eminence; but his wife, a daughter of Austria, supplied her husband with ambition, and Augustus became a candidate. He was supported by the courts of Vienna and St. Petersburg, and opposed by France. His father's old competitor, Stanislaus, whose daughter had become the wife of Louis XV., was elected by the Poles. But a Russian army advanced to enforce the pretensions of

Augustus III., and after a short contest the Poles yielded in 1736, having disputed gallantly but unsuccessfully the passage of the Vistula. Stanislaus fled and renounced his pretensions to the throne of Poland. Augustus, although crowned at Cracow in the commencement of 1734, did not become undisputed monarch of Poland till after the Diet of Pacification, held at Warsaw in 1736.

In 1743 an alliance was concluded at Warsaw between England, Saxony, and Austria, for the defence of the house of Hapsburg. The King of Prussia, Frederick the Great, instantly marched 100,000 men into Saxony, routed all that opposed him, and made himself master of Dresden, December, 1745. Augustus took refuge in Poland. The truce of 1746, however, restored to him the electorate; and at the same period took place the marriage of Augustus' daughter, Maria Josepha, with the Dauphin of France—a marriage from which sprung Louis XVI., Louis XVIII., and Charles X., kings of France. The impossibility of coping with Prussia, already proved by the defeat of the Saxons and their allies, could not keep Augustus or his minister from leaguuing once more against Frederick, and even planning to share that king's territories with Russia. In consequence of this Frederick invaded Saxony in 1756, and succeeded in taking prisoner the entire Saxon army in its entrenched camp at Pirna. Augustus again fled to Poland.

His reign in this latter country was as pernicious as in Saxony. The supremacy of Russia was allowed silently to establish itself in Poland under the empty government of Augustus. Pictures, porcelain, fêtes, and music were the only cares of this prince. He expired at Dresden in October, 1763.

AUK is a family (Alcidae) of ANSERES, including the razor-bills (*Alca*) and the guillemots (*Uria*), the little auk (*Mergulus*) and the puffins (*Morion*).

The auks are expressly adapted for their aquatic home. The power of the wings as organs of flight is circumscribed, but they are efficient paddles; and in one species, the great auk, they are paddles only, and not constructed for flight. The legs are extremely short but powerful, and placed so posteriorly that in resting on the rocks the birds assume an upright attitude, the whole of the tarsus or leg, as well as the toes, being applied to the surface. The toes are usually only three in number, and fully webbed; when the hind toe exists, it is in a rudimentary condition. The bill differs in form in the different genera, but is mostly compressed laterally, and often grooved at the sides. The auks are natives of the seas of the northern hemisphere, the penguins taking their place in the southern. Fishes, crustacea, and other marine productions constitute their food. They breed, generally, associated in large companies, on the ledges of sea-cliffs, in holes and caverns, or on rocky places, laying only one disproportionately large egg. The young are fed from the crop of the parents, even when able to swim amidst the waves.

The largest of this family is the great auk (*Alca impennis*), which has been extinct since about 1840.

The bill of the great auk was deep and compressed; the upper mandible arched and hooked; the nostrils were nearly hidden by the feathers of the forehead; the wings were short, but proved of great service as paddles. These birds dived with great ease, and, using their wings, pursued beneath the surface their aquatic prey. On shore their movements were awkward, but they shuffled along with considerable despatch.

The great auk was common in the Orkneys and Hebrides, and in Iceland, and traces of it in the shape of bones half-fossilized have been recently found in Newfoundland. Remains of it have been found in the kitchen-middens of Denmark, Iceland, and North America. That it inhabited Britain in prehistoric times has been proved by the discovery of bones at Caithness, and also in 1878 in a limestone cave

on the Durham coast. In 1881 bones of the great auk, in company with those of mammals and aquatic birds and numerous bone implements, were unearthed in the island of Oronsay, Scotland. It used to breed in the clefts and caverns of rocks above the highest tides. The female laid a single egg, as large as that of a swan, of a yellowish-white tint, marked with strokes and lines of black. It fed on crustacea and fishes.

The great auk, of which specimens may be seen in the British Museum, measured nearly 3 feet in length. The upper part of the plumage is deep black, with the exception of a patch of white on the forehead and around the eyes, and a slight band of white across the wings; the under plumage is white, bill and legs dull black. In winter the cheeks, throat, forepart and sides of the neck became white. The change from the winter plumage took place in spring.

The little auk, or rothe (*Merygulus alle*) has all the characteristics of the Alcidae, though it is less than 9 inches in length. The bill is short, thick; the nostrils are lateral, basal, and partly covered with feathers; the wings and tail are short.

The little auk is a native of the Arctic Circle, and is recognized as a winter visitor to the coasts of Scotland. It abounds on the coasts of Greenland and Spitzbergen, and congregates in thousands at Melville Island. When the flocs of ice are broken up by the wind, myriads of these birds may be seen riding on the waves, busily engaged in searching for various marine animals tossed up by the agitated waters. The ocean is in fact the home of this little bird, except during the season of incubation, when it resorts in thousands to the ledges of precipitous rocks, on which the female deposits her single egg, of a pale bluish-green. The flight of this species is rapid, low, and never long-sustained. The upper plumage is black, with a white bar across the wing; the throat and chest are pitch black in summer, more or less white in winter; the lower surface is white.

AULIC COUNCIL, a council of state, instituted by the Emperor Maximilian I. in 1500. Towards the close of the fifteenth century the progress of the Turks alarmed the princes of Germany, and led them to feel the necessity of uniting in order to resist the common enemy. Accordingly the Imperial Chamber was instituted in 1496, as the high court of justice of the empire. It was to consist of one judge of princely rank, and of sixteen assessors, half of whom were Protestants, holding their office independent of any power. The number of judges was afterwards increased. Not contented with thus organizing a federal judicature, the German princes demanded of Maximilian a permanent council or senate, composed partly of members of the diet, who should govern the empire during the frequent absence of the emperor. This was established at Vienna in 1500. By degrees this purely Austrian institution became the Aulic Council.

The judicial functions reserved for the Aulic Council were—1, all feudal causes; 2, all cases of privilege or reserve in which the emperor was personally concerned; 3, all Italian causes. The merely civil and German causes were referred to the Imperial Chamber. But the Austrian princes made use of the Aulic Council in other than judicial functions. It was with them not only a court of appeal, but a political council, which was called upon to give the monarch advice in weighty matters, more especially of legislation. It thus corresponded with the French Grand Conseil, or Conseil d'État. The Aulic Council was finally regulated by Ferdinand III. in an edict issued in 1654, subsequent to the treaty of Westphalia, and the admission of Protestants to share in all the privileges and functions of the empire.

At the extinction of the German empire by the renunciation of Francis II. in 1806, and the establishment of the Confederation of the Rhine under the protection of the

Emperor Napoleon, the Aulic Council ceased to exist, after having been established more than 300 years.

AULOS, the principal ancient pipe, or flute-like instrument. There is reason to think that it was a reed instrument, rather therefore like the oboe than the flute; the former usual translation ("flute") is therefore not now used. The aulos was sometimes double, two pipes blown at once; and often a leather band passed round the head to press the pipes against the mouth lest wind should escape, and both not be securely blown. The second pipe (usually longer than the other) was no doubt a "drone," giving a fixed note, like the drone of a bagpipe, to accompany the tune played upon the other.

AULUS GELLIUS was a Roman of good family, who flourished as a critical writer and grammarian under Hadrian and the Antonines. His great work is "Noctes Atticæ," composed during the long nights of winter, in a country house in Attica, whence its title. It is a curious farrago, without order of any kind, but extremely valuable. It is indeed the commonplace-book of a cultured man, filled with extracts from the principal writers of antiquity on all sorts of subjects, with valuable criticisms by Aulus Gellius himself. The whole twenty books are extant with the exception of the eighth, and of this we have the index preserved. Like **ATHENÆUS**, Aulus Gellius has preserved in this way fragments of writers otherwise unknown to us, and of works by known authors the rest of which have perished. His value, therefore, can hardly be overestimated. The principal edition of Aulus Gellius, with notes by Gronovius, was published at Louvain in 1706. There is an English translation by Beloe (1795).

AUMALE, a small town of France in the department of Seine-Inferieure, is situated on the slope of a hill above the Bresle, 35 miles N.E. of Rouen. It is famous for the battle between the forces of the League under the Duke of Parma and the army of Henry IV., who was wounded in the action, and had a narrow escape for his life. The town has manufactures of woollen cloths, and a trade in wool and cattle. Grain and hemp are cultivated in the neighbourhood. The town was formerly called Albemarle, from the Latin *Alba Marla*; and the Duke of Albemarle, in the English peerage, takes his title from it. Aumale was created into a comtship by William the Conqueror, and in 1769 it came into the possession of the house of Orleans.

AUMALE, CHARLES DE LORRAINE, DUC D', was uncle to Henry, duke of Guise, the head of the League. [See **GUISE**.] After the assassination of the Duke of Guise in December, 1588, D'Aumale and the Duke of Mayenne became the heads of their party. D'Aumale in 1589 took possession of Paris, from which King Henry III. had been obliged to retire; he dissolved the parliament by force, and sent its members to the Bastille. After the surrender of Paris to Henry IV., D'Aumale joined the Spaniards, who had invaded the province of Picardy, for which he was declared guilty of high treason by the parliament of Paris, and sentenced to be broken on the wheel, which sentence was executed in effigy on the 24th of July, 1595. D'Aumale, however, continued to reside abroad, chiefly in Flanders. He died in 1631.

AUNIS, the smallest of the former provinces of France. It now forms the north-western portion of the department of CHARENTE INFÉRIEURE.

AURANTIACÆÆ, or the Orange tribe, are dicotyledonous polypetalous plants, belonging to the order **RUTACEÆ**. They have dark-green compound leaves, filled with fragrant essential oil collected in little transparent dots, and a superior ovary changing to a succulent fruit, the rind of which is also filled with fragrant essential oil. No natural tribe of plants can well be more strictly defined than this, and none have properties more uniform and definite. It consists of trees or shrubs found in the

temperate or tropical parts of the Old World, and unknown in a wild state in America. Besides the orange, other plants belonging to this tribe are the lemon, lime, shaddock, citron, ægle. The wood is excellent, and the flowers are of great beauty and fragrance. The name *Aurantifera* is derived by a false analogy from the Latin *aurum*, "gold," as if referring to the colour of the fruit. But "Orange" is really the Persian *nâranj*, which has lost its initial *n* in the Italian *arancio*, and has nothing to do with "gold."

AURELIAN, Emperor of Rome (**LUCIUS DOMITIUS AURELIANUS**), was born at Sirinium, in Pannonia, about 212 A.D. His father was a husbandman. At an early age he enlisted as a common soldier. Tall, handsome, and strong, skilful and diligent in all athletic and military exercises, temperate in his habits, and of acute intellect, he rose from his humble station to the highest military offices during the reigns of Valerian and Clandius ("the Gothic").

On the death of Clandius, A.D. 270, the legions of the Danube raised Aurelian to the imperial dignity. The new emperor suppressed an inroad of the barbarians, and compelled them to recross the Danube; but he withdrew the Roman troops from Dacia, and made the Danube the frontier of the empire. Aurelian was recalled to the north of Italy by an invasion of the Alemanni or Marcomanni, who after a hard contest were destroyed, A.D. 271. Aurelian now visited Rome, and punished with severity the authors of a sedition which had disturbed the city.

Aurelian at this time was master only of the central portion of the empire. Spain, Gaul, and Britain acknowledged Tetricus, a pretender who had sprung up at the death of Valerian. Tetricus is said to have himself betrayed his own army into a defeat near Chalons, while he himself, with a few friends, took refuge with Aurelian. Spain and Britain acknowledged the victor. Gibbon places these events in 271, contrary to most other historians, who make them subsequent to the fall of Zenobia.

The west having been thus secured, Aurelian prepared to reduce PALMYRA. Odenatus, prince of Palmyra, was dead, and his widow, ZENOBIA, a woman of accomplished tastes and unusual courage, succeeded him. The hostile armies met at Emesa, in Syria, where Aurelian gained a decisive victory, and continued his march to Palmyra unopposed, except by the attacks of the "Syrian robbers." The resistance of the city did credit to its warlike fame. Aurelian offered favourable terms of capitulation—an honourable retreat to Zenobia, and the reservation of their rights to the Palmyrenes; but a haughty answer was returned by the queen. Zenobia at last felt resistance to be hopeless, and she tried to escape, but was intercepted and brought to the Roman camp. The soldiers clamoured for her death. Aurelian refused to shed female blood; but he took his revenge on her advisers, among whom perished Longinus, who had been Zenobia's instructor in Greek literature. The city surrendered A.D. 273, and was not plundered.

Aurelian had already returned to Europe, when he heard that the Palmyrenes had revolted and massacred the small garrison. He returned in wrath, and inflicted a cruel vengeance on the people. Aurelian was recalled a third time to the East by a rebellion in Egypt, excited by Firmus, a rich merchant. This was immediately quelled by the emperor's presence, and he returned to Rome, where he celebrated his victories with a magnificent triumph.

After visiting Gaul and Illyricum, Aurelian set out on an expedition against Persia, to revenge the defeat of his predecessor Valerian, but between Hecalea and Byzantium he was assassinated by some of his officers, in October 275.

This stern and successful soldier had many great qualities, among which temperance, love of order, and justice were conspicuous. His faults were those of his education and his military habits. Many important works at Rome were due to his care, the most important being the

new enlarged city wall, still in great part existing. This vast undertaking he did not live to terminate.

(Vopiscus, in the "Historia Augusta;" Eutropius; Aur. Victor; Gibbon, c. xi.)

AURELIUS, MARCUS, Roman emperor, was one of the noblest characters who ever lived. As a child he was so perfectly truthful that the Emperor Hadrian used to call him playfully *Verissimus*, instead of *Verus* his real name, that is, not "true" only, but "most true." The name by which we know him was only his by adoption. When Antoninus Pius adopted him he took the name of his new father, as was usual, and from Marcus Annus Verus became Marcus Aurelius Antoninus. The Emperor Hadrian (with whom the young Marcus was a great favourite), when he adopted Antoninus Pius, afterwards his successor, arranged that Antoninus should at the same time adopt Annus Verus, father of Marcus Aurelius, and this brought the latter into the imperial succession. The father of Aurelius dying while he was young, his grandfather took charge of his education. We learn from Aurelius that he had masters in every science and polite art, whose names and qualifications he has gratefully recorded ("Medit." i. 1). These men were not only tutors, but models upon which the more perfect character of Aurelius was formed; the foundation, however, he piously says, was laid by his parents. Most of his teachers were Stoics. One of the most distinguished of them, Rusticus, procured him a copy of the works of Epictetus, which confirmed his natural inclination to Stoicism. He delighted in commenting upon them, and thanked the gods for furnishing him with a manual from which he could collect wherewith to conduct his life with honour to himself and advantage to his country.

M. Aurelius was born at Rome A.D. 121, became "Cæsar" and married Faustina, the daughter of Antoninus Pius, 138, was consul 140, and at the death of Antoninus in 161 succeeded to the empire. He shared the throne with his adopted brother, Lucius Verus, son of Lucius Ceionius Commodus, a favourite of Hadrian, who died, and in memory of whom Hadrian had caused the youth to be adopted by his avowed successor Antoninus, at the same time that he adopted Marcus Aurelius and his father. Lucius Aurelius Verus thereupon took that name, instead of Lucius Ceionius Commodus. Still further to strengthen the tie between the emperors, Marcus Aurelius gave Verus his daughter Lucilla in marriage.

For a "philosopher," as he is often styled, and an avowed lover of peace and simplicity, the life of Marcus Aurelius was the strangest possible—filled with war, troubles of state, and domestic unhappiness. Almost at once disturbances arose on the German border, and at the same time the long-expected Parthian war broke out. Lucius Verus went in command of the army to the East. He reached Antioch, but no further, and there gave himself up to the enjoyment of the most degrading sensual pleasures. His lieutenant, Avidius Cassius, was left in command of the army, and after gaining several brilliant victories he compelled the Parthians to sue for peace. Verus returned to Rome, 166, where he received the honour of a triumph, though he had contributed nothing towards the successes obtained. The empire was, however, now threatened with greater disasters; and the alarm caused by extensive incursions of barbarians into the northern provinces, by devastating floods, and by earthquakes which laid in ruins a large part of the city of Rome, was further increased by a terrible outbreak of the plague, which had been brought from the East by the soldiers of Verus. To allay the terrors of the people rites of unusual solemnity were celebrated, and hecatombs of victims were offered to the gods. Both emperors then set out for the war. They were for a time completely successful, and the Marcomanni and the tribes confederate with them were compelled to submit in 168. The following year Lucius Verus died, and Marcus Aurelius was left sole

emperor. After enlisting in the army large numbers of gladiators and slaves, Marcus Aurelius gained several important victories over the barbarians, in one of which the Marcomanni were nearly exterminated. The most famous of these victories, however, was one gained over the Quadi in 174, which gave rise to eager discussion among Christian historians in reference to the story of the "Thundering Legion." The narrative of this event, as given by Dion Cassius, is that when the Roman troops were dying of thirst in the summer heat, the cloudless sky suddenly darkened and heavy showers of rain fell. While the soldiers were availing themselves of this supply they were suddenly attacked by the enemy, and would have been cut to pieces but for a fierce storm of fire and hail which descended upon the foe. That in this battle some extraordinary events occurred is fully proved by the general consent of ancient historians, the sculptures on the Antonine Column, and by a letter of Aurelius which is still extant.

Aurelius gladly accepted the peace offered by the barbarians, for his presence was urgently needed to quell a rebellion under Avidius Cassius, urged on by the unworthy Faustina. Like her mother (the profligate wife of Antoninus, of the same name), she was treated with the greatest gentleness by a husband far too good for her; though Aurelius did not erect a temple to "goddess Faustina," as Antoninus had done to the elder Faustina, to the lasting wonderment of us who gaze at its noble portico in the Roman Forum. Faustina accompanied Aurelius to the East, but died on the way, it was rumoured by her own hand, through remorse and despair, for the emperor (as he nobly said) had arrived too late. Cassius had been assassinated by his own soldiers already, and on learning this Aurelius issued an address to his soldiers, in which he lamented that he had lost the opportunity of freely pardoning the man who had proved a traitor. When the head of Cassius was brought him he shrank from it with horror, and refused to see the men who had done the deed. On his arrival in the East he caused all the papers of Cassius to be burned unread, and treated the provinces which had rebelled with the greatest gentleness and magnanimity. He passed through Greece on his way home, and during his stay at Athens he founded chairs for each of the four schools of philosophy. He celebrated a bloodless triumph on his return to Rome on the 23rd of December, 176, but the next year he was compelled by a fresh outbreak of war to proceed to Germany. He was again victorious in several engagements; but his constitution, always weakly, was now shattered by his incessant toil and anxiety, and he died, either at Vindobona (Vienna) or Sirmium, on the 17th March, A.D. 180, after a reign of nearly twenty years.

The life of Antoninus was one of singular nobility, purity, and benevolence, and by his people he was regarded as being specially sent by the gods to bless mankind. His death was bewailed as a public calamity, and for upwards of a century afterwards he was revered among the household gods of Rome. As has been remarked above, Aurelius was early instructed in the principles of the Stoic philosophy; and of this stern ethical system, which offered the most earnest opposition to the growing licentiousness of the time, he is regarded as the brightest flower and noblest exponent.

He was never weary in the pursuit of knowledge, and his studies extended to oratory, metaphysics, mathematics, music, poetry, and painting, in addition to philosophy, morals, and jurisprudence, in which he specially excelled. The only work of Antoninus which has come down to us is a Greek one entitled "*Τὰ ἐν ἑαυτῷ*" (the "Meditations"), which is justly regarded as the "highest ethical product of the ancient mind." It was a commonplace-book filled with fine thoughts, but not arranged in any order. It has been translated into most European languages, and an edition in Persian was published at Vienna in 1831. His love for the ancient philosophy, however, caused him to regard the

progress of Christianity with aversion and hostility, and led him to sanction and encourage the persecution of those who had embraced it. Most probably he was very imperfectly acquainted with its tenets and influence. The trust in a crucified God seemed to the Greeks folly, and to the Romans a degrading superstition. Then the hostility which Christianity had to encounter necessitated secret meetings for worship, and these gave some colour to those accusations of horrible criminality which were freely made by its opponents, while its wholesale rejection of all the gods of heathendom seemed to threaten the very foundations of society. If the personal gentleness and kindness of Marcus Aurelius here can be no question, and he has been justly described as "a better Christian in all but the dogmatic sense of the word than almost any of the ostensibly Christian sovereigns who have since reigned."

The man who wrote as follows is beyond any feeble praise of ours:—"If thou workest at that which is before thee, following right reason seriously, vigorously, calmly, without allowing anything else to distract thee, but keeping thy divine part pure, as if thou shouldst be bound to give it back immediately; if thou holdest to this, expecting nothing, fearing nothing, but satisfied with thy present activity according to nature, and with heroic truth in every word and sound which thou utterest, thou wilt live happily. And there is no man who is able to prevent this."

And that noble saying of Aurelius, "I seek for truth, by which no man ever yet was injured," has deservedly become the common property of all single-hearted inquirers. The proverb "Even in a palace, life may be lived well" forms the text of a superb sonnet by Mr. Matthew Arnold. These instances, culled at random, show at once the wonderful beauty of the book and its perennial interest. It is as true and as commonly quoted to-day as it was seventeen centuries ago.

A fine edition of Marcus Aurelius was published in Leipzig in 1865. The chief old edition is that by Gataker (London, 1697). A quaint translation from the French is that by Bouché, "L'ordre des Bénédictins," 1546 ("The Golden Bole"); but the best is by Mr. Long, "Thoughts of the Emperor Marcus Aurelius," revised edition (London, 1886).

AURELIUS VICTOR, SEX'TUS. Four books are commonly published together under the name of Aurelius Victor. 1. "*Origo Gentis Romanæ*," an imperfect work, beginning with Janus and Saturn, and going down to the foundation of Rome. 2. "*De Viris Illustribus Urbis Romæ*," which contains short biographies of the most illustrious Romans, with a few foreigners, from Romulus down to M. Antonius. 3. "*De Caesaribus*," which contains the lives of the emperors from Augustus to the appointment of Julian to govern Gaul, A.D. 356. 4. "*De Vita et Moribus Imperatorum Romanorum*," or "*Aurelii Victoris Epitome*," another history of the emperors from Augustus to the death of Theodosius the Great, A.D. 395.

The only one of these four works that can with certainty be ascribed to Aurelius Victor is "*The Caesars*." He says of himself ("*De Cæs.*" xx. 5), that he was "born in the country, of a poor and unlearned father." "*The Caesars*" seems, on the evidence of a passage written in the present tense, to have been composed about A.D. 359.

Aurelius Victor flourished under Constantine and his successors, and rose to notice on account of the patronage of the Emperor Julian, who appointed him governor of Pannonia. Theodosius raised him to the high post of city prefect, and he served as consul with Valentinian in A.D. 373.

The chief edition of Aurelius Victor is that of Arntzenius (Amsterdam, 1733, 4to), and the most modern is by Schreveler (Leipzig, 1831, two vols. 8vo).

AUREOLE (from Lat. *aurum*, gold), the golden halo or "glory" which is placed behind the heads of saints and martyrs in religious pictures.

AUREUS, or **DENARIUS AUREUS**, the ordinary

Roman coin of gold, was equivalent to twenty-five silver denarii, or 100 sesterii.

Gold was first struck at Rome B.C. 207. The earliest coin of gold at this time was named a scruple (*scrupulum*), and went for twenty sesterces of that age. It had the head of Mars on one side, and an eagle standing on a thunder-bolt upon the other, with the word "ROMA" below, and was marked XX at the back of the head of Mars. Seventeen and a half Troy grains is the weight of one in perfect condition in the British Museum. Its double was marked XXXX, or forty sesterces, and its triple J X, or sixty, which weighed 52 grains. The symbol which precedes the X on this triple scruple indicates L or 50. See the whole set engraved in Plate III. COINS.

Pliny ("Hist. Nat." 33, c. 13) says that it was afterwards usual to coin forty aurei out of a pound of gold, and that the Roman emperors by degrees diminished their value, till they made them forty-five to the pound. The aureus was sometimes called *solidus*, as opposed to a half-aureus, or *semis*. A constitution of Valentinian and Valens ("Cod. Just." 10, tit. 70, c. 5) declares that the pound (*libra*) of gold must be considered as seventy-two solidi, which remained thereafter the standard to the close of the empire.

An aureus of Julius Caesar, in the British Museum, weighs 123 grains, which is the weight of an English sovereign, but the Roman coin is worth about a shilling more, as it contains no alloy, or very little. The coin of Carausius, Roman pseudo-emperor in Britain, of which a copy is here given, is believed to be unique. The Rev. Mr. Cracherode, who bequeathed it to the British Museum,



bought it for £150. An aureus of the British king Cymbeline (Cymbelinus) is shown in Plate II. COINS. Of the aurei of Constantine in the Museum one weighs 66 grains, three 67, three 69½, one 73½, and one 81½. The average weight of the aurei of Augustus appears to have been nearly 121 grains; that of Nero's aurei, nearly 117. An aureus of Augustus will be found engraved in Plate II. COINS.

AURICH, a town of Prussia, in the province of Hanover, is 15 miles N.E. of Emden, with which it is united by the Treckschuiden Canal. It is neatly built in the Dutch style, and is embellished with an old palace, the residence of the former princes of East Frisland. Aurich contains 4500 inhabitants, and has a lyceum or college, a few tanneries, distilleries, and tobacco factories, as well as a large trade in horses.

AURICLES (Lat. *auricula*, ear), the upper or receiving cavities of the heart. Externally their lower edge is indented somewhat like a cock's comb or a dog's ear, whence their name. Internally they are smooth (except within the overlapping edge or *auricula* which gives them their name, and except upon the adjacent portion of the principal cavity, the *sinus venosus*, and in these parts the surface is ridged like the teeth of a comb, *pectinatus*). The great veins open into the *sinus venosus*. In the right auricle as the blood of the superior vena cava descends by its own weight no valve is found to it, but the inferior cava has a valve, the Eustachian valve, whose function is to prevent the blood from running back into the vein from the auricle when the latter contracts. There are no valves in the left auricle. The right auricle receives the dark blood from the body, through the two great *vena cava*, and

as soon as filled discharges itself into the right ventricle. The left auricle receives the purified bright scarlet blood after its passage through the lungs, and discharges itself into the left ventricle, the most powerful of all the four chambers of the heart; and with good reason, for it is this chamber which drives the blood through the aorta to the very extremities of the body. The auricles are, as might be supposed, of much slighter construction than the ventricles; but all the chambers, auricles and ventricles alike, are about the same size, holding from 4 to 6 cubic inches of fluid. It is hardly necessary to add that there is no passage from one auricle to the other, nor from one ventricle to the other. For further account, see HEART.

AURICULA (*Primula Auricula*), one of the Primrose order (PRIMULACEÆ), is found wild abundantly on the Swiss Alps, where its flowers are usually of a clear bright yellow; they are sometimes white, but this is unusual. It has for centuries been an object of cultivation by florists, who have succeeded in raising from seed a great number of varieties, which have little resemblance to the wild plant except in foliage. Instead of yellow or white there is substituted a centre of deep purple or brown, surrounded by a broad edge of a white, gray, or green powdery matter.

AURICULIDE, a family of Gastropod Molluscs, having a ringed conical muzzle, and a thin mantle with a thickened edge. The shell is spiral, covered with a horny epidermis, and has the mouth, which is elongate, furnished with strong plaits on the columella. With few exceptions the species, which are numerous, are natives of tropical countries, and live in brackish water marshes, estuaries, and mouths of rivers.

AURIGA, the Charioter, a constellation situated between Perseus and Gemini. [See Plate CONSTELLATIONS, N. Hem., half-way between fig. VI. and the Pole, to the right of the solstitial colure.] It is represented as a man holding a bridle in the right hand and supporting a goat and kids on the left arm. The star in the body of the goat, called Capella, is of the first magnitude, and has no rivals in our hemisphere for brilliancy except Arcturus and Vega. There is no satisfactory account of the mythology of this figure. It is said to have been the Horus of the Egyptians.

AURILLAC, capital of the department of Cantal in France, is situated on the right bank of the Jourdanne, a little above its junction with the Cère, a feeder of the Dordogne, 144 miles W. of Bordeaux. The town stands in a beautiful valley, on lava deposits which in former ages ran from the now extinct volcanoes in the Cantal mountains. The town has wide but irregular streets, which are kept clean and fresh by running streams. There are three suburbs, viz. St. Stephen, Des Frères, and Du Buis. The suburb Des Frères took its name from two convents which were formerly in it. In the suburb of St. Stephen is a castle on an elevated situation which commands the town. The other remarkable buildings are the churches of St. Géraud and Notre Dame, the Benedictine Abbey in the suburb of Du Buis, the hotel of the prefect, the corn-market, and the theatre. There is a college, and societies of arts and commerce. The manufactures carried on are paper, lace, household utensils, carpets, beer, and leather; the chief trade is in cattle, cheese, stockings, tapestry, and lace. The population in 1882 was 11,500. There are horse-races in the summer, which attract large numbers of visitors, and near the town is the model farm of La Peyrouse. Pope Sylvester II. was a native of the town, and a statue to him was erected in 1851.

AURORA, the Latin and more usual name of the Goddess of the Dawn; in Greek, *Éos*. Rather is she the goddess of the morning-red, the "rosy-fingered morn," for *Aurora* is but a later corruption of *Aurora*, and this is from *Avōs*, the Æolic form of *Éos*. The two names, so dissimilar at first sight, prove therefore to be identical, and both originate from the Aryan root *āus*, to burn, to glow. [For an account of ARYAN ROOTS see article ARYAN.]

Aurora was the daughter of Hyperion and Thia, and sister of Helios and Selēnē, the sun-god and moon-goddess; and her office was to lift the veil of night with her rosy fingers, seen by the poetic Greeks in the streams of colour, which herald the coming sun, athwart the sky at dawn. Homer makes her precede the sun during the day, as well as at dawn; and this view is taken most happily by the celebrated Guido in his matchless fresco on the ceiling of the Rospigliosi Palace at Rome, which has for ever fixed the conception of Aurora for modern times, as Plüdis fixed the type of Zeus and of Athena for the ancients. In this exquisite work of art Guido shows the goddess strewing flowers before Apollo in his sun-chariot. The Hours, lovely maiden-forms, robed each in a different tint of the rainbow, dance round the chariot, which moves swiftly and steadily, drawn by dun-coloured horses, across the sky. Dawn is just breaking over an Italian sea-coast scene beneath.

Aurora was not happy in her loves [see CEPHALUS, ORION], and still less in her marriage. She did indeed ask and gain immortality for her husband Tithonus, but she forgot to ask for perpetual youth. He became at last so decrepit that his voice was a mere chirping croak and his body fleshless, and at Aurora's prayer he was changed into a cicada and became the father of grasshoppers. The son of Aurora and Tithonus, MEMNON, is a famous figure in Greek heroic mythology. By the Titan Astræus, guardian of starlight, her husband in her other marriage, she became the mother of the winds ZEPHYRUS, BOREAS, and NOTUS or AUSTER, of EOPHORUS (HEBESUTUS), the morning star, and all the stars of heaven. Possibly most of these latter were regarded as descendants, not all as children—otherwise the goddess had an unusually large family, even for Greek mythology.

AURO'RA BOREALIS, or "Northern Daybreak," so called because it usually appears at or near the north, and presents a light somewhat resembling that which precedes sunrise.

The phenomena attending the aurora borealis are so various, in almost every particular, that a general description can scarcely be given; but that which follows corresponds nearly to the appearances usually observed.

In the northern region of the horizon, but having its centre about 20° westward of the northern point—that is, nearly in the direction of the magnetic north—there is occasionally perceived soon after sunset an arched cloud extending from 10° to 100° in length, and rising to a height which may amount to 40°. It is sometimes gray and obscure, but generally a brilliant white, and through it the stars are perceptible; its upper edge, which is luminous and irregular, is often nearly parallel to the horizon. From the upper edge, and also from openings in the cloud, streamers or columns of light resembling jets of a luminous fluid driven from a syringe are seen to rise, each column being narrowest and brightest at its lower extremity, and becoming broader and fainter as it ascends. The streamers are sometimes at considerable distances from one another, but often they are very close together, and occasionally they cross each other in the zenith, where there is then formed a small meteor of a green, blue, or purple colour, which proceeds thence to the south. The columns themselves are of a white, red, or blood colour, and occasionally they have exhibited the tints of the rainbow. The phenomenon lasts sometimes nearly all night, the streamers gradually disappearing, and the horizontal cloud, before it ceases to be discerned, assuming the appearance of the morning twilight. (See Plate.)

The aurora is described by Aristotle ("De Meteoris," lib. i. c. 4, 5) as an appearance resembling flame mingled with smoke, and of a purple, red, or blood colour. Cicero, Pliny, and Seneca also make allusions to or give descriptions of such phenomena; and it is probable that the pre-

tended appearances of armies fighting in the heavens, which have been described as preceding remarkable events, were aurora boreales. The terror which such appearances seem to have excited renders it very probable that they did not occur so frequently before the eighteenth century as they have done since. They were long regarded with dread. In them men saw—

"Fierce, fiery warriors fight upon the clouds,
In ranks, and squadrons, and right form of war."

The frequency with which the aurora borealis is now witnessed, almost nightly in northern regions, has led many to conclude that the phenomenon has always been there of almost constant occurrence. But Celsius (1733) affirms the contrary, and states that the oldest inhabitants of Upsala considered the phenomenon as a great rarity before 1716. The appearance of an aurora is so commonly accompanied with a *magnetic storm* (shown by the variation of the compass needles), that this fact, coupled with its central position with regard to the magnetic north, suggests an electrical origin for the light. Yet *electrical* conditions on the earth's surface are not altered. A certain correspondence with the periods of sun spots [see SUN] is observed in the greater auroral displays. But little is known as yet as to the nature or cause of the aurora. As to the first, the spectroscope informs us that it is gaseous, differs from terrestrial substances, and resembles in its spectrum that of electricity discharged through rarefied air. As to the latter, Franklin's theory still remains the most probable, namely, that it is due to electric discharges in the upper air, in consequence of the differing electrical conditions between the cold air of the Polar regions and the warmer streams of air and vapour raised from the level of the ocean in tropical regions by the heat of the sun. We know from experiments since Franklin's time that the vapour arising from salt water is positively electrified in the act of evaporation.

The Arctic voyager Nordenskiöld reports ("Voyage of the *Vega*," 1882) that a perpetual "aurora-glory" surrounds the earth at the Pole, at a height of about 120 miles, with a diameter of 1250 miles—seen, of course, by him as an arc.

AURUNGABAD, a city of Hindustan, in the dominions of the Nizam of Hyderabad, is situated in a hollow, on the banks of the river Dudhna, a mountain stream which separates the city from a considerable suburb called Begum Pura, the communication with which is preserved by means of two substantial bridges. A supply of excellent water for the use of the inhabitants is brought by means of stone conduits from the neighbouring hills, and is distributed to numerous stone reservoirs in different parts of the city. The principal street is nearly 2 miles long, and of a considerable width, with a spacious quadrangle at one extremity and a handsome market-place near it. The palace of Aurungzebe, now in ruins, covers an extensive space. Here is also a mausoleum erected by order of Aurungzebe to the memory of his daughter; it bears some resemblance to the Taj Mahal built by the Emperor Shah Jehan at Agra. The population has been estimated at 60,000, and the city covers a space about 7 miles in circumference. A considerable traffic is carried on in the bazaar, where both European and native goods are exposed for sale. In 1865 Aurungabad was connected with Bombay, 175 miles distant by railway.

AURUNG'ZEBE, Mogul emperor of Hindustan, born in 1618, ascended the throne of Delhi 1658, and died at Ahmednagar 1707, in the eighty-ninth year of his age and fiftieth of his reign. His proper name was Mohammed, but he received from his grandfather the designation Aurungzebe, or "ornament of the throne." He was the son of Shah Jehan and the Empress Mehd-Altā, and the great-grandson of Akbar Khan.

The first period of Aurungzebe's career extends from his entrance on public life, at the age of fourteen, to the year 1657, during which he bore the title of Shalhzadeh, or prince imperial. His elder brother Dara was the advocate of liberal opinions, and held that the differences between the Hindus and the Mohammedans were of minor importance, and need not interfere with the political equality of those who professed the faith of Brahma. Aurungzebe thereupon stood forth as the champion of the Muslim faith in all its purity and exclusiveness. His next brother, Shujah, was a wine-drinker—a latitudinarian in the ceremonies and practices, as Dara was in the creed. Aurungzebe therefore drew the hands of his ceremonialism as tight as the dogmas of his belief. His third brother, Murad, was a sensualist. Aurungzebe therefore appeared as the purest in morals. His policy was based upon a knowledge of human nature, and it led to personal success. In 1657, when Aurungzebe was nearly forty years of age, the Emperor Shah Jehan was seized with an illness which held out little prospect of recovery, and the princes commenced their strife. Dara was at Delhi. Shujah was governor of Bengal; Aurungzebe, of the Deccan; and Murad, of Guzerat. The imperial authority fell, of course, into the hands of Dara, and he exercised it in such a manner that Shujah at once took arms. The armies of the two elder brothers met at Monger, and Shujah was defeated. Aurungzebe and Murad, who had held aloof hitherto, now advanced with their joint forces. Aurungzebe had gained over the generals of the imperial party, and Dara was compelled to take to flight, seeking refuge in Agra. Shah Jehan, however, was still alive, and he made overtures to Aurungzebe, expecting to draw him into his power by proffers of peace. The trap was too apparent, but the prince accepted it, and used it for the capture of his father, whom he thenceforth detained, at the same time lavishing on the old Mogul all the luxuries of an eastern palace. Aurungzebe was crowned at Delhi, 1658. Dara and Murad were put to death, and Shujah, after many adventures, came to a violent end in Aracan.

The first years of the new reign were years of peace and of apparent prosperity. But even then the Mahratta power was beginning to acquire strength under the guidance of the chief Sewadji, who had been insulted by Aurungzebe, and who ever after maintained a hostile front to the Mussulman emperor of Delhi. The Rajputs also, a race of high-caste Hindus, were alienated by the distinctions of religion enforced by the emperor; and the Hindus at large were exasperated by the imposition of the *jezia* or capitation tax, and by the Mohammedan outrage on their idolatrous temples and the edifices devoted to their Hindu superstitions.

In 1663 Aurungzebe attempted the conquest of Assam, and the expedition was at first successful, and amassed a considerable amount of plunder; but the rainy season came on, and brought with it a destructive fever which thinned the ranks of the Mongols, and forced them to retire. In the following year he resorted to the valley of Cashmere for the restoration of his health, and it was during this period that Sewadji commenced his predatory war which was to develop the Mahratta power. After the year 1670 the Mongol power was more severely tried, and the Mahrattas even gained a victory over their Mussulman foes in a pitched battle fought in 1672. The Afghans also showed a hostile disposition, and the emperor was obliged to head his forces against the mountaineers. In 1676 Aurungzebe commenced his attack upon the Hindus by the vexatious and impolitic measures which divided his subjects into favoured and unfavoured sects. In 1679 the capitation tax was enforced, and the Rajputs were arrayed against the throne. In 1680 Sewadji died, and was succeeded by his son, who had the misfortune to fall into the hands of the emperor, and was put to death with great

cruelty. After 1688 Aurungzebe made himself master of the kingdoms of Golconda and Bejapoor, with the intention of devoting his energies to the subjugation of the Mahrattas, and this struggle occupied him to the end of his life. As he grew old he grew suspicious, and not without reason. He was apprehensive that his father's fate might be his own, and that his son might play over again the usual course of Eastern ambition. He died at Ahmednuggur in the Deccan, in 1707, master of twenty-one provinces, and of a revenue of about £40,000,000 sterling. Mussulmans regard him as the greatest of their sovereigns. In the early part of his reign he had cautioned the penmen of his empire against writing history, and to this circumstance the world of letters is indebted for a more truthful account than could in all probability have appeared under his own eye, or during his lifetime. A private record was kept by Mohammed Hашein at Delhi, and published in the reign of Mohammed Shah, and from this work the Hon. Mountstuart Elphinstone derived the materials for that portion of his "History of India" which relates to the reign of Aurungzebe. Bernier, a French physician, who resided for twelve years in India, and officiated professionally at the court of the emperor, has also left an account of the empire in his "*Voyages et Description de l'Empire Mogol*." It may serve to render more apparent the great power and military resources of Aurungzebe if we quote the figures of Bernier as to the composition of the emperor's camp in a march from Delhi to Cashmere. The guard of cavalry consisted of 35,000 men; that of infantry, 10,000. The camp contained 150,000 horses, mules, and elephants; 50,000 camels, 50,000 oxen, and between 300,000 and 400,000 persons: almost all Delhi followed the court, whose magnificence supported its industry.

AUSCULTATION (from Lat. *auscultare*, to listen), the method of distinguishing the states of health and disease by the study of the sounds produced by the organs in the movements which they make in the performance of their functions. The sound of the air in the wind-pipe during inspiration is different from that in the same tube in expiration; the sound of the air in the larynx during the act of speaking is different from both; while the sound produced by the action of the heart is very characteristic, and even the action of its different chambers may be discriminated the one from the other by its sound. Although these sounds may be easily heard by applying the naked ear to the body, their recognition is greatly facilitated by the stethoscope. This instrument was invented by Laennec, a French physician. Commencing at first with a quire of paper rolled in the form of a cylinder, he afterwards constructed the wooden stethoscope which bears his name, and which in a modified form is now in general use. Armed with this instrument, Laennec commenced a careful study of the sounds of the chest in health and disease, and thus laid the foundation of a system whereby a new, clear, steady, and certain light has been thrown on almost all the diseases to which the organs contained in the chest are liable. The instrument is also eminently serviceable in the detection of certain forms of uterine disease, and in the diagnosis of pregnancy.

AUSPICES. See AUGUR.

AUSTELL, ST., a market town on the S.E. coast of Cornwall, is situated a short distance inland from St. Austell Bay, 13 miles N.E. of Truro, and 286 from London by the Great Western Railway. The town occupies the side of a hill, and slopes gradually to a rivulet which waters a narrow valley. The streets are narrow, but the town generally has much improved of late years. The church is a handsome ancient structure, with a tower adorned with statues and sculptured ornaments. It was thoroughly restored in 1870. St. Austell was a poor village in the time of Henry VIII., but has risen to its present size in consequence of its proximity to valuable tin

and copper mines. Porcelain clay and good building stone are also obtained in the neighbourhood. There are harbours at Charleston and Petewan, through which coals are imported from Wales, and the produce of the mines and porcelain clay are exported. The pilchard fishery is actively prosecuted in St. Austell Bay. The population in 1881 was 3612.

AUSTEN, JANE, was born in 1775 at Steventon, in Hampshire, of which parish her father was rector. Mr. Austen, who was a highly cultivated and accomplished man, took considerable pains with his daughter's education. Miss Austen is said to have been beautiful, and possessed of fascinating manners. During the last years of the rector's life the family resided chiefly at Bath. On his decease his widow and two daughters retired to Southampton, where they remained till 1817, and afterwards to the village of Chawton, in the same county, at which place Jane wrote her novels. In the summer of 1817 she was forced by declining health to forsake retirement and seek proper medical advice. She went to Winchester, and there expired on the 24th July of that year, aged forty two, and was buried in the cathedral.

Miss Austen published her first novel, "Sense and Sensibility," in 1811, which soon attracted attention, and the authoress received £150 from its profits. "Pride and Prejudice," "Mansfield Park," and "Emma," followed. After her death her friends published "Northanger Abbey," and "Persuasion;" the first being her earliest and poorest performance; the latter, completed but a short time before her death, the most finished, and certain passages of pathos surpassing all the rest.

Miss Austen's novels are occupied with delineations of English society in the middle and higher ranks. Her characters are the most every-day characters, and her incidents the most every-day incidents. There is nothing to startle the reader in her pages. Her books contain nothing more exciting than a village ball, or the gossip at the village spinster's tea-table; nothing more tragic than the overturning of a chaise in a soft ditch, or a party being caught in a shower going to church. Miss Austen has little humour. Her ridicule is refined and feminine. There is never more than a smile upon her lips. In her own delicate walk she is without a rival. There are scarcely any books so perfect as hers within their limits. Never was there more exquisite manners-painting; never was English middle-class life, with its little vanities, its petty spites, its quiet virtues, more delicately and truthfully rendered.

Miss Austen knew perfectly her own strength. In a letter to a friend she compares her productions to "a little bit of ivory, 2 inches thick," in which she worked "with a brush so fine as to produce little effect after much labour." Although never violently popular—her merits are much too exquisite for that—she has received ample recognition and fame. Dr. Whately made her works the subject of an elaborate article in the *Quarterly Review* in 1821. The *Edinburgh Review* also spoke highly in her praise, and Sir Walter Scott enters the following sentences in his diary, after reading "Pride and Prejudice" for the third time:—"That young lady had a talent for describing the involvements, and feelings, and characters of ordinary life which is to me the most wonderful I ever met with. The big *bow-wow* strain I can do myself like any now going, but the exquisite touch that renders ordinary commonplace things and characters interesting, from the truth of the description and the sentiment, is denied me. What a pity such a gifted creature died so early."

An interesting biography of Miss Austen was published by her nephew, the Rev. J. E. Austen Leigh, in 1870, and a collection of her letters, edited by Lord Brabourne, in 1884.

AUSTER, the Latin name for the god of the south wind, son of the goddess AURORA. The south wind was

often a hot wind in Italy (the modern *sirocco*), hence the name Auster, which comes from the same primal root ($\sqrt{\text{us, to burn}}$) as Aurora. The Greek name for the god was *Notus*.

It is from Auster that the Latin adjective *australis* (southerly) comes, whence our AUSTRALIA (the continent of the south). The word *austere* (literally, "dried up"), meaning "harsh," "severe," comes from the same source.

AUSTERLITZ is a small town on the Littawa, in the circle of Brünn, in Moravia, about 9 miles east of the town of Brünn; population, 2000. This place owes its celebrity to the "battle of the three emperors," which was fought in its vicinity on the 2nd of December, 1805, and gained by Napoleon over the combined armies of Austria and Russia. This victory cost the Austrian crown nearly 24,000 square miles of territory, 2,786,000 subjects, and an income of £1,300,000 sterling, independently of severe temporary sacrifices. See BONAPARTE.

AUSTIN PRIARS. See AUGUSTINIANS.

AUSTIN, JOHN, a very distinguished writer on jurisprudence, was born 3rd March, 1790. When only sixteen years of age he entered the army, but left it after the battle of Waterloo, and was called to the bar in 1818. After his marriage, which took place in 1820, Mr. Austin lived in Queen's Square, London, close to Jeremy Bentham and James Mill and the intimacy which sprang up between them had much influence on his future life. The state of his health compelled him to leave the bar, but he was appointed to the first professorship of jurisprudence in the London University (now University College). His lectures were well received by a few distinguished men, but the subject was not recognized as an absolutely necessary part of legal study, and as it did not supply that kind of knowledge best calculated to promote practical success in the profession the students were few in number; and as there was no other income except that arising from their fees Mr. Austin was compelled to relinquish the appointment in 1832, having held it five years. In the same year he published his "Province of Jurisprudence Determined," a work of great learning, but which was not much appreciated at the time, although it is now admitted by all competent judges to place its author in the front rank of writers on that subject. In 1833 he was appointed a member of the criminal law commission by Lord Brougham, and afterwards a member of the commission appointed to inquire into the grievances of the Maltese. In 1838 he removed to Germany, where his slender means enabled him to live in a better position than he could possibly do on them in England. He was, however, obliged to return in 1848, in consequence of the revolution in that year. He took up his residence at Weybridge in Surrey, and died there in December, 1859, universally respected. His *Lectures on Jurisprudence*, which had remained in MS., were edited by his wife, and published in 1861-63 as a "Sequel to the Province of Jurisprudence Determined." Both are universally recognized as enduring monuments of learning and genius, and entitle their author to rank with Hobbes and Bentham. An admirable memoir of Austin is prefixed to the *Lectures on Jurisprudence*, and a very appreciative article appears on him in Mr. J. S. Mill's "Dissertations and Discussions."

AUSTIN, SARAH, wife of the preceding, and commonly known as Mrs. Austin, belonged to the Taylor family of Norwich, and was an eminent authoress. Distinguished by her familiarity with German and French language and literature, she did good service to the English public by translations of some of the most popular writers in those countries. Those best known are Ranke's "History of the Popes" and the "Characteristics of Goethe," from the German; and Cousin's "Report on Public Education in Prussia" and Guizot's "History of the English Revolution," from the French. After her husband's death she edited

his Lectures on Jurisprudence with very great ability. She died at Weybridge, 8th August, 1867.

AUSTRALASIA, in its usual sense, groups together the continent or island of Australia with New Zealand, Tasmania, and the smaller islands about these, all of which lie in the region between the Indian Ocean and the Pacific, south-east of the great continent of Asia—hence the name of Austral, *or* South, Asia. No arbitrary meaning, however, is attached to the term, which is sometimes applied so as to include the Polynesian Islands. Both these and almost all the other Australasian islands and colonies will be found described in separate articles.

AUSTRALIA is the largest island upon the surface of the earth. It lies to the south-east of Asia, between the parallels of $10^{\circ} 39'$ and $39^{\circ} 11\frac{1}{2}'$ S. lat., and the meridians of $113^{\circ} 5'$ and $153^{\circ} 16'$ E. lon. Its greatest length from W. to E.—that is, from Dick Hartog's Point to Point Cartwright—is about 2400 miles; its greatest width, between Cape York on the N. and Wilson's Promontory on the S., is 1971 miles. Its coast line is about 7750 miles in length, while the extent of this island-continent is nearly 3,000,000 square miles—that is, more than twenty-six times the size of Great Britain and Ireland, and only about one-fifth smaller than the continent of Europe. Its least distance from England is 11,000 miles. The northern shores of Australia are washed by the waters of Torres Strait, which separates it by a distance of only 90 miles from New Guinea; by the Gulf of Carpentaria, the Arafura Sea, and the Indian Ocean. It is bounded on the south by Bass Strait, which divides it from Tasmania, and by the South Pacific Ocean; on the east by the South Pacific Ocean; and on the west by the Indian Ocean.

A fair idea of Australia and the location of its several colonies may be gathered by considering it as divided into three parts—western, central, and eastern. The western part consists entirely of the colony of Western Australia; the central of South Australia and its allied Northern Territory; the eastern of the three colonies of Queensland, New South Wales, and Victoria. The proportion of the colonies to each other and to the whole continent may be readily understood by the following comparison:—If the continent were divided into 100 equal parts, Victoria would comprise 3, New South Wales 10, Queensland 23, South Australia 30, and West Australia 34.

Describing the location of these colonies more particularly in the same geographical order of west to east—**WESTERN AUSTRALIA** is described by its name. It occupies the whole of the western portion of the continent, and is surrounded on its northern, western, and southern sides by the sea, its eastern boundary being the colony of South Australia; its capital city is Perth, the next in importance being Fremantle. To the eastward of West Australia, and stretching from ocean to ocean, occupying the whole of the central portion of the continent, is the colony of **SOUTH AUSTRALIA**, the northern part of which is now known as the Northern Territory. Adelaide is the capital city of South Australia; other principal towns are Gawler, Port Adelaide, Kapunda, and Mount Gambier. To the eastward of the Northern Territory and South Australia, and to the north-east of Australia itself, lies the colony of **QUEENSLAND**. Its capital is Brisbane; Ipswich, Toowoomba, Mackay, Maryborough, Rockhampton, and Cooktown are other important towns. South of Queensland, and eastward of South Australia, is the mother colony of **NEW SOUTH WALES**. Sydney is the capital city; Maitland, Goulburn, Bathurst, Grafton, and Yass rank immediately after. Occupying the most southerly part of the continent, south-west of New South Wales, and eastward of South Australia, is the colony of **VICTORIA**. The metropolis is the city of Melbourne; Ballarat, Geelong, Sandhurst, and Castlemaine being other leading centres. **TASMANIA** is an island 150 miles to the south of Victoria, and separated

from it, as before mentioned, by the straits named after their discoverer, Bass. It is surrounded by the South Pacific Ocean; the capital city is Hobart, Launceston being next in importance.

Before proceeding to describe the various geographical features of this magnificent colony, we propose to sketch the several steps by which it has been discovered and opened up. The story of the difficulties and dangers that have been bravely encountered, especially within recent years, in the effort to obtain an accurate knowledge of Australia, will help to give a good idea of its leading physical characteristics.

Discovery and Exploration of Australia.—In the beginning of the seventeenth century Pedro Fernandez de Quiros and Luis Vaez de Torres undertook a voyage of discovery in the western part of the Pacific (1605–1607), and while they remained together they discovered the Terra del Espíritu Santo, which, when rediscovered by Cook, was found to consist of many islands, and was called by him the New Hebrides. Torres, having been separated from Quiros, sailed along the southern coast of New Guinea, and passed through the straits which separate that island from the continent of Australia, and which at present bear his name. He saw the coast of Australia at its most northern point, Cape York, only a few months after it had been discovered by the Dutch, but he was not aware of its being part of a vast continent, and thought it was some islands of small extent.

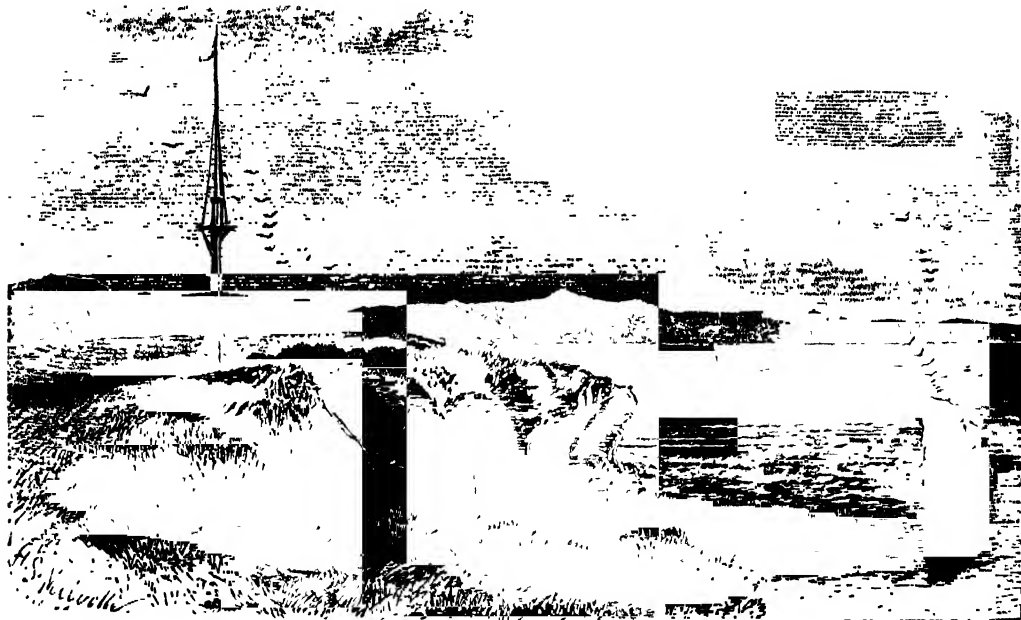
Not long before the voyage of Quiros and Torres, the Dutch sent, in 1605, a yacht called the *Duyfjen*, from Bantam, to explore the coast of New Guinea. On its return from the expedition this vessel fell in with the coast of continental Australia, to the south of Endeavour Strait, on the eastern shores of the Gulf of Carpentaria. The Dutch did not at first pursue their voyages of discovery, though the greatest portion of the coasts of the continent was shortly afterwards first accidentally seen by their vessels carrying on the commerce between Europe and Batavia. Hertzog, Zeehen, Von Edels, Van Nuyts, De Witt, and Carpenter, discovered a large extent of coast between 1616 and 1628. In 1642 Tasman discovered Van Diemen's Land, the modern Tasmania, which for more than a century was believed to be part of Australia.

The English entered much later on the career of discovery, and were not at first successful. Towards the end of the seventeenth century Dampier explored some parts of the coasts of the continent, and surveyed New Britain and New Ireland, which had previously been discovered by the Dutch; but he did not add to the number of discoveries. After the middle of the eighteenth century the discoveries of the English were of great importance. Captain Cook, in his three voyages, besides exploring and surveying a large number of the islands formerly known, discovered the eastern coast of Australia, from Cape Howe to Cape York, which was called by him New South Wales, with New Caledonia, the Sandwich Islands, and many smaller islands. After the establishment of the English colony in New South Wales, those coasts of the continent which till then had not been visited by Europeans were explored. In this task two young men were prominent, Messrs. Bass and Flinders, the former a surgeon in the navy, the latter a midshipman, whose means were at first limited to a little boat 8 feet long, which they called the *Tom Thumb*. The coves to the southward of Port Jackson were examined; the insula-tion of Van Diemen's Land was determined (1798), the merit of which is chiefly due to Mr. Bass, whose name was given to the separating strait; and jointly in a small schooner they circumnavigated that island, exploring its rivers and harbours. Having gained promotion, and being appointed by the home government to the *Investigator*, a ship expressly fitted out for the service, Captain Flinders, during the years 1802 and 1803, minutely surveyed the

southern and eastern coasts, with a large part of the northern, and was the first to introduce the name of Australia as a substitute for the old Dutch name of New Holland. He disclosed more fully the world-famous Port Phillip; discovered the great inlets of St. Vincent's and Spencer's Gulfs, now included in the colony of South Australia; and landed on Kangaroo Island, which lies off the mouth of the latter, and protects it from the roll of the Southern Ocean, being probably the first human being that ever stepped upon the strand. This large island received its name from the number of the animals found there, which were at that time so tame as to allow the sailors to knock them down like sheep. Encounter Bay, to the eastward, was so called by the navigator as the spot where he met with M. Baudin (1805) in command of the corvette *Géographe*, when a peaceful interview took place between the officers and crews in time of war. Surveying voyages successively prosecuted by Captains King, Wickham, Grey, Stokes, Stanley, and others, have since completed the illus-

tration of the Australian coast-line; but down to a very recent date, portions of the north-western shores were only conjecturally delineated on our maps.

For twenty-five years after the first Australian colony, that of New South Wales, was started, nothing was known of the interior of the island-continent except at a comparatively short distance from the shores. The inhabitants of Sydney looked wistfully westward to the Blue Mountains, visible from the heights around, which long foiled every effort made by the government surveyors, as well as by enterprising settlers, to pass them, owing to their tortuous and profoundly deep defiles, bounded by vertical walls of rock, and often terminated by a similar perpendicular facing. Mr. Bass succeeded in scaling several precipices by means of iron hooks fastened to his arms, and was let down by ropes into intervening chasms, but after fifteen days' exertion he relinquished the task as hopeless. The colonists had almost universally adopted the opinion that the barrier was insurmountable, when a practicable passage was found



Coast near Illawarra, New South Wales.

in the year 1813, leading to the pastoral lands since known as the Bathurst gold fields. This route was traversed by Governor Macquarie, with his lady, and a retinue of officers, in May, 1815, and is now the great western road of the colony. In consequence of this discovery, a large extent of country on the further side of the mountains was rapidly opened up by explorers and squatters. The Macquarie, Lachlan, and Darling rivers were met with, and believed at first to flow into some vast inland sea, the existence of which in Central Australia was long a favourite notion with speculative geographers. Northward, in 1823, Mr. Oxley surveyed the Moreton Bay district, now Queensland, and named its principal stream the Brisbane. Southward, in 1824-25, Messrs. Howell and Hume, spirited sheep farmers, pushed their way overland to the shores of Port Phillip, and were the first Europeans to cross the greatest known Australian river, subsequently called the Murray. In 1880 this stream, which collects the western waters of New South Wales, was traced by Captain Sturt

to its discharge into Lake Victoria, a shallow arm of the sea communicating by a narrow channel with the open ocean at Encounter Bay. Numbers of the aborigines were seen, who could scarcely be brought to believe that the discovering party were of the same genus as themselves, and placed their hands against those of the strangers, in order to ascertain if the number of fingers on each corresponded. Nothing astonished them more than the act of taking off the hat, as they seem to have considered it an integral part of the bodies of their strange visitors. Sturt's representations of this region led to the first exploration of the Adelaide country, with a view to the establishment of a new colony, that of South Australia. Captain Barker, at the head of a party of eight persons, charged with this mission, perished in the execution of it. On reaching the narrow channel connecting Lake Victoria with the sea, he stripped himself and swam across, for the purpose of looking out from a convenient site. "Curiosity prompted me," says a bystander, "to time his crossing. The current

was running out strong; but he accomplished the feat, at 9.58 A.M., in three minutes. On arriving at the opposite shore, he ascended the sandhill, gazed around for a few moments, and disappeared." He was never seen afterwards. But it was ascertained that three natives speared him as he rushed into the water to escape from them, and the tide carried away his body.

Many lamentable incidents of a similar kind mark the history of adventure in Australia. In 1835 Major (afterwards Sir Thomas) Mitchell, started from Bathurst on an exploring tour, with a numerous and well-equipped party, one of which was Mr. Peter Cunningham, the indefatigable and accomplished botanist. Lured by his love of plants to wander from the main body, he disappeared in the interminable wilderness, and though carefully sought for was never found; but from facts which subsequently came to light, he appears to have been murdered by the natives. An obelisk commemorates him in the Botanic Garden at Sydney. It was the custom of this estimable man to carry about with him in his excursions a bag of peach-stones, which he carefully planted in the sterile wilds for the benefit of future travellers, as well as of the aborigines. If a peach-stone is planted in the ground in any part of this country where some supply of moisture is obtained, there will be a tree laden with fruit in three or four years, without any kind of culture. Peaches are now commonly met with wild in the woods, and yield a wholesome refreshment to the wayfarer, the more valued as the native forests afford nothing whatever in the shape of fruit for the sustenance of man. Mr. Oxley, in 1817, found a noble expanse near the Lachlan, which he called Regent's Lake. When this was sought for by Sir T. Mitchell, in 1836, it was for the most part an extensive plain, covered with luxuriant grass. There was some water at one extremity scarcely a foot deep, the refuge of black swans and pelicans, the latter standing high upon their legs above the remains of the lake. That it had been a splendid expanse at no distant date was evident from the water-line on the shores, while, within this former boundary, stood dead trees of a full-grown size, apparently killed by too much moisture. The site had thus been woodland, lake, and grassy plain. In 1828 Lake George was a fine sheet of water, 17 miles in length by 7 in breadth, extending into the counties of Argyle and Murray. But it was without fish, and surrounded by dead trees of the *Eucalyptus*, some of them 2 feet in diameter, which also extended into it until they were wholly immersed. An old native female remembered the time when the whole was a forest, a statement supported by the presence of the lifeless timber. In October, 1836, the entire lake was gone, and its basin was a grassy meadow, similar to the adjoining Breadalbane Plains. Alternating cycles of extreme moisture and drought, extending through considerable periods, offer perhaps the true explanation of the transitions.

Soon after the colony of South Australia was founded, its government despatched Mr. Eyre from Adelaide overland to King George's Sound. The long journey was accomplished in the year 1840, but the route only disclosed a thoroughly inhospitable region, in traversing which all the party suffered severely from fatigue and privation, while some of its members perished by the way. The next year the same explorer, who believed in the existence of a great central sea, was directed to strike northward into the interior, from Spencer's Gulf, and if possible reach the tropic of Capricorn. He failed in the latter object; and instead of meeting with a grand inland reservoir, the singular horse-shoe Lake Torrens was discovered, a huge serpentine tract of soft boggy ground or mud, covered in places with a shallow sheet of salt water, but often extensively converted by heat and drought into a desert of loose drifting sand. The next attempt to reach the heart of the country was made by Captain Sturt, in 1845, who

succeeded in the object—closely approached the southern tropic due north from Adelaide, under the meridian of 130° E.; but narrowly escaped with life from a region wholly destitute of water, and rivalling in its sterility the worst parts of the African Sahara. Captain Sturt's journey was in a year of exceptional drought, and speaking in his journal of Cooper's Creek he says, "The blasts were so terrific that we wondered the grass did not fire. This was nothing ideal, for everything animate and inanimate gave way before it; the horses stood with their backs to the wind and their noses sunk upon the ground, without the muscular strength to raise their heads; the birds sat upon the boughs mute and terrified, and the parched leaves fell like snow, whilst the thermometer graduated to 127°, and its tube broke owing to the expansion of the mercury. Before fresh supplies reached them the leader lost the use of his limbs from scurvy, his skin became black, his muscles contracted." The opinion was general from this date, till corrected by subsequent experience, that the whole of Central Australia was a frightful wilderness, incapable of supporting life, and therefore unworthy of any hazard being encountered in the attempt to traverse the dry and desolate waste.

At the time when Sturt's adventure was in progress, an unobtrusive German naturalist, Dr. Ludwig Leichardt, with seven companions, made the overland passage from Moreton Bay to Port Essington, during which he discovered and named the Burdekin, with other rivers, and returned by sea from the completion of the enterprise. This was an extraordinary journey of 1800 miles, through an unknown part of the country, performed in fifteen months; but as its direction did not lead him through the more interior districts, the conviction remained current that Dante's line might be applied to them—

"Abandon hope, all ye who enter here,"

as consisting of a series of scorched, stony, sandy, and saline plains.

After resting a brief space in the settled districts, the intrepid Leichardt rallied a second band of adventurers around him, who had now reason to repose confidence in him as a leader, from his success in the expedition just named. His project was to proceed from east to west, or from New South Wales to the Swan River settlement, a distance little short of 3000 miles in a direct line, hoping to find by the way a succession of oases, like those in the African or Arabian deserts, which would enable him to recruit his party on the journey. He started from the Darling Downs in the early part of the year 1848, but no certain tidings have ever transpired respecting the gallant band. One conclusion is sufficiently clear, either that the whole of the party perished successively for want of provisions, or were cut off in some murderous attack of the natives. The latter melancholy fate befell another traveller, Mr. Kennedy, in the year of Leichardt's disappearance. The incidents accompanying his death strikingly illustrated the extremes of character in the Australian black, for while dogged and butchered by the natives in cold blood, he was defended to the last by a native attendant.

In 1858 Mr. McDonall Stuart proceeded from South Australia into the interior under a more westerly meridian than that which had previously led Captain Sturt into an inhospitable desert, and traversed an extensive area available for sheep-pasture, with scenery pleasantly diversified by lakes and creeks of salt and fresh water. Encouraged by this success he set out with only two followers in March, 1860, with the intention of crossing the country from sea to sea. The bold colonist very nearly succeeded in accomplishing his object, following generally the meridian of 134° E. Having gained the central region, where the name of Central Mount Stuart was bestowed upon a conspicuous

hill, he proceeded thence to about latitude $18^{\circ} 40' S.$, or within 250 miles of the Gulf of Carpentaria, suffering much by the way, chiefly from the want of water. Here the country was good. All difficulties seemed to be at an end and success certain, when, owing to the number and determined hostility of the natives, he was compelled to desist from the enterprise, and return to Adelaide, which he regained in the following September. In the meantime a carefully-organized and well-equipped expedition had started from Melbourne with the same object in view, which enabled the sister-colony of Victoria to snatch from South Australia the distinction of being the first to open a path through the land from the southern to the northern seas. The outfit of the travellers included the necessary amount of stores for a long absence, with all kinds of instruments for scientific observation, and the novel addition of a troop of camels, twenty-seven in number, expressly imported from Asia. The party consisted of Robert O'Hara Burke, the leader; Mr. Wills, as scientific observer; Dr. Herman Becker, medical attendant and botanist; Ludwig Becker, artist and naturalist; Mr. Landells, in charge of the camels; and thirteen subordinates, with horses, waggons, and every provision likely to insure success—the largest expedition ever fitted out in the Australian colonies.

According to the plan previously arranged, Cooper's Creek was fixed upon as a place of rendezvous and final starting-point—a well-known locality a little to the east of Sturt's tract in 1845, and about one-third of the distance across the country. Here a permanent depot was to be established as a basis for further operations. Arrived at Cooper's Creek, he divided the party, and without delay left the depot in charge of Brahe, a petty officer, with verbal instructions to await his return for three months or longer, if provisions and other circumstances would permit. From this point Burke, on the 16th December, 1860, pursued his journey with only three companions, consisting of Wills, the scientific assistant, two men, King and Gray; taking along six camels, one horse, and three months' provisions. These were the real explorers, destined to accomplish a hazardous enterprise, and make a great discovery, with the melancholy result of only one of them surviving its performance.

Proceeding nearly due north, and keeping generally to the meridian of $140^{\circ} E.$, they passed day after day well-watered plains, with numerous lines of timber, and every evidence of a good grazing country. The 11th of February, 1861, brought them to the tide-water of the Gulf of Carpentaria, and they had conclusive proofs of having gained the verge of the Northern Ocean. On returning by a new route, to the east of the outward track, a region of the finest character for pastoral purposes was passed through, with every appearance of possessing a permanent supply of water. Early in April the want of provisions began to tell upon the travellers, and it became necessary to kill the horse for support. Worn down with arduous travel, afflicted with scurvy, almost without clothes, their six camels reduced to two, the survivors struggled manfully on; and with half-paralyzed limbs regained their old quarters at Cooper's Creek on the 21st of April, after an absence of four months and five days. It was nightfall when they arrived; and rarely has human fortitude been put to a greater test than by the disappointment which awaited them. The station was deserted. The word "Dig," cut on an adjoining tree, directed them to a *cache* where some provisions were buried—a welcome refreshment—with a record to the effect that the party left in charge under Brahe had quitted the spot only seven hours before the staggering wayfarers reached it. Severe as was this misfortune, it was bravely borne, as a note written by Burke the next day, the last he ever penned, duly deposited in the *cache*, testifies. "The return-party from Carpentaria, consisting of myself, Mr. Wills, and King

(Gray dead) arrived here last night, and found that the depot-party had only started on the same day. We proceeded on to-morrow slowly down the creek towards Adelaide by Mount Hopeless, and shall endeavour to follow Gregory's track, but we are very weak. The two camels are done up, and we shall not be able to travel further than 4 or 5 miles a day. Gray died on the road from exhaustion and fatigue. We have all suffered much from hunger. The provision left here will, I think, restore our strength. We have discovered a practicable route to Carpentaria, the chief portion of which lies on the 140th meridian of east longitude. There is some good country between this and the stony desert. From there to the tropic the country is dry and stony. Between the tropic and Carpentaria a considerable portion is rangy, but it is well watered and richly grassed. We reached the shores of Carpentaria on the 11th of February, 1861. Greatly disappointed at finding the party here gone.—R. O'Hara Burke, Leader.—P.S. The camels cannot travel, and we cannot walk, or we should follow the other party. We shall move very slowly down the creek."

Mishaps attended the steps of the wanderers. Landa, one of the camels, having sunk in a bog, could not be extricated, and was shot as he lay. Rajah, the other, was killed for food. After proceeding some distance in the direction indicated their exhausted condition enforced a return to the depot, to which, by a scarcely conceivable mischance, Brahe had returned in the interim, and again quitted finally without discovering a trace of their visit. Thus abandoned, life was preserved for some time by the seeds of the nardoo plant, which the natives make into bread; but it was too unnutritious to have any recruiting effect. Unable to crawl, Wills insisted upon being left, while the other two went in search of the blacks as their last chance. Burke sunk on the way, and soon expired; and King, on returning to Wills, found him a corpse, stretched on the spot where he had separated from him. The sole survivor was fortunate enough to meet with natives, who kindly entertained him with their best fare, and among whom he was discovered by a relief-party from Melbourne on the 15th of September, wasted to a skeleton, and scarcely to be distinguished as a civilized being. The terrible sacrifice was not, however, made in vain. The men accomplished the main object of their mission, crossed and recrossed the great island continent, discovering a fine habitable country where only desolation had been surmised. Almost on the spot where Burke and Wills perished of starvation there now stands a thriving town, with many social adjuncts.

On New Year's Day, 1861, Mr. McDouall Stuart, nothing daunted by the failure to which we have referred, again left Adelaide (aided by a liberal grant from the colonial government), and succeeded in reaching about 100 miles beyond his former position, to lat. 17° , lon. 133° ; but an impenetrable "scrub" here barred all further progress. He made strenuous and prolonged efforts to pass the obstacle (his horses being on one occasion 106 hours without water), but without success, and was reluctantly compelled to return for want of provisions. Arriving safely in the settled districts in September, he again started in less than a month on the route now familiar to him; and this time well-deserved success rewarded him. This journey was perhaps one of the most important in its results of any that have been made into the interior of Australia. It marked out a track from the settled districts of South Australia to the extreme north, along which it was subsequently found possible to construct a telegraph line, with fixed stations; and it also led to the discovery of one of the most fertile districts of tropical Australia, watered by a fine unavigable river, the Adelaide, and which, from its position in regard to the islands of the Malay Archipelago, is best fitted to become the nursery and home of flourishing communities.

No further expeditions of any account were undertaken for some years, until, utilizing the track of M'Douall Stuart, South Australia accomplished the gigantic work of forming an overland telegraph line, by which daily communication has, since 1872, been kept up between the Australian continent and the rest of the civilized world. This great work was completed in August, 1872, and has a length of nearly 2000 miles.

The principal portion of the Australian continent now remaining unexplored was the immense tract of country west of the telegraph line, comprising more than half of South Australia, and the whole of the unsettled portions of West Australia. In the exploration of this vast unpromising area of nearly 1,000,000 square miles, the first place is due to Mr. Ernest Giles, who in 1872 started from Chambers Pillar, near the Charlotte Waters Telegraph Station, with the intention, if possible, of crossing in a westward direction to the sources of the Murchison River. In this he was not successful; but he discovered the extensive salt lake Amadeus, and explored for about 100 miles north of it; the whole country being arid with sandstone ridges and spinifex or mallee "scrub." In 1873 he started again, aided by the South Australian government, and travelling about 200 miles south of the former course, reached a point nearly midway between the telegraph and the known part of West Australia. Here the country consisted of open sandhills or gravel, covered with spinifex, and absolutely without water. Turning back, he struck due north about 100 miles, finding only one small water-hole on the way, and then came upon some fine hilly country, with rocky gorges, running streams, a beautiful waterfall, and abundant pasture. Exquisite flowers decked the ground, and the place was an oasis of beauty in the midst of a huge wilderness. But it did not last long. The streams ran dry as soon as they left the shade of the hills, and both north and south there was nothing but a parched desert. Packing water in kegs, he pushed due west, with one companion, for 120 miles over an arid country, when, one of the horses breaking down, he was obliged to return. Giving the horse that remained to his companion Gibson, he instructed him to go back to the kegs, 30 miles off, give the horse a good drink, and then push on for the camp and bring back water, adding, "I depend on you to bring me relief." Gibson lost his way, and was never seen again. Mr. Giles walked on the whole way to the kegs, without water. Then, carrying the keg and his other baggage, a load of 50 lbs., he started, and was seven days in reaching his depot, having been without food for five days, and being able to walk only about 5 or 6 miles a day.

While Mr. Giles was thus engaged, several other expeditions had been sent out by the South Australian and West Australian governments. Mr. Gosse, with camels, horses, and a dray, started in 1873, nearly in the same direction as Mr. Giles, but did not reach so far west. He discovered the remarkable Ayer's Rock, a pillar or pyramid of granite about 1000 feet high, and not far from it Mount Olga, a precipitous mass of rock 2 miles long, 1 mile wide, and more than a quarter of a mile in height.

In April, 1873, Colonel Egerton Warburton started from Alice Springs (on the telegraph route just north of the tropic) with seventeen camels, and succeeded in reaching the Oakover River, in Western Australia, in December, after extreme hardships, with only three of the camels alive. The line of this exploration was about lat. 21° and 22°. The country, for the greater part of the distance, was a fearful desert, with not a drop of surface water for hundreds of miles at a stretch, and in every way inferior to that traversed by Giles. Colonel Warburton was nearly starved on this journey, and part of the time had to travel strapped at full length on his camel; but he was the first to traverse the great Australian desert from east to west.

At one portion of the journey the explorers were reduced to extremities for water, and they resolved to make a final rush to reach the Oakover River, distant about 170 miles. The attempt was made; but had it not been for the providential finding of water on the way, the whole party would have been lost. Arrived at the Oakover, they found the channel perfectly dry; but a small water-hole and some birds supported a portion of the party, while others went down the river to the nearest station and obtained help. The condition of the Oakover at this time will give some idea of the singular changes met with in Australia. When Colonel Warburton arrived, the bed of this river was nearly 400 yards in width; but there was not a drop of water in it, and apparently there had not been for a long time. The colonel and his friends went to bed one night when the channel of the river was quite empty, but at three o'clock in the morning it was full to the bank—a splendid river, with plenty of ducks and large trees, borne along by the current, floating on its surface.

In 1874-75 a greater feat was accomplished by Mr. John Forrest, who, with horses only, crossed through a longer extent of uninhabited country, from the Murchison River to the telegraph line a little north of Peake Station. The track of the route lay about 300 miles south of that of Colonel Warburton, and for fully two-thirds of the distance the country was found to be without permanent water and thoroughly uninhabitable, though often covered with a scrubby vegetation. Towards the telegraph line it became more hilly, with more frequent streams and water-holes, and there were here and there patches of fertile country. Forrest's journey occupied six months, and was the first accomplished completely across from west to east. Natives were found numerous in the interior, and three times attacked the party; much game was also found, even in the most wretched spinifex desert.

In 1875 the veteran explorer Giles, furnished with camels and assisted by the South Australian government, succeeded in crossing from Port Augusta, at the head of St. Vincent's Gulf, to Perth, by an entirely new route, about midway between Forrest's line and the south coast, and nearly following the thirtieth parallel of south latitude. From the Youlden Depot, about 120 miles north of Fowler's Bay, to the first settlements in West Australia was traversed in little more than four months. After leaving a small pond in longitude 128° 40' no water was found for a distance of 325 miles, when a very fine spring was accidentally hit upon among barren sandhills. This probably saved the party from destruction, as it was again 150 miles beyond this before any more water was found. Southward toward the coast the country was open and grassy; northward mostly covered with "scrub" and spinifex, but all equally waterless. In this expedition Mr. Giles travelled 2500 miles, and found no country available for settlement; while for more than 1000 miles he had to bore his way through continuous scrubs.

Of all the various Australian explorations, however, none have been more important or interesting in their results than that of Mr. Alexander Forrest in 1879. The West Australian government having made a liberal grant towards the expenses of a journey through their northern territory, the settlers gave twenty-six horses, and on the 18th January, 1879, taking provisions for six months, Forrest and his spirited little band started from Perth, with the view of making their way along the north-west country to Port Darwin, on the northern coast. Arriving at King's Sound, they followed its shores until they struck the Fitzroy River—a noble stream, teeming with fish, navigable for a distance of 100 miles inland, and running through rich country ranged over by thousands of emus and kangaroos. The river would appear to be of large size, as the explorers were obliged to follow its left bank for 250 miles before they were able to cross it. As far as could be estimated,

the Fitzroy basin contains 5,000,000 acres of land suitable for pastoral purposes. Leaving the river, they toiled on for 140 miles at the base of a table-land 2000 feet high, until they succeeded in surmounting the range, and then hill after hill rose before them. A fortnight was spent and nine horses lost in endeavouring to make tracks over these heights, when the attempt had to be abandoned. They therefore returned to the Fitzroy River, took a little rest, and on the 10th July, with thirteen horses and fifty days' provisions, started E.N.E. for the overland telegraph line. It was now necessary to economize their rations; and as they consumed the load of a horse, they finished by consuming the horse itself, after drying the flesh in the sun. They travelled 100 miles to the Dividing Range, crossed it in lat. 18° 10', and then proceeded west 240 miles to the Victoria River, near its junction with the Wickham. During this journey they discovered millions of acres of fertile, well-grassed country, intersected with numerous large rivers, all running west and north-west. They saw no big game; but flocks of wild turkeys were met with, and the rivers, well stocked with fish, were covered with geese and ducks. During his entire journey Mr. Forrest estimated that he saw 25,000,000 acres of pastoral land, the greater portion in undulating flats, and poison plants being conspicuously absent. Large numbers of natives were met with, and though they may fitly be described as displaying "manners none and customs nasty," they did not molest the travellers. For the most part they were fine big men, with characteristics extremely interesting to the ethnologist. That they had never met white men before was shown by their refusal to eat any of the food offered them, and by the fact that not a woman was ever to be seen, though there must have been plenty of them with the different tribes encountered. On leaving the Victoria the explorers came to an almost waterless country, and their provisions began to fail. When they were about 100 miles from the telegraph line Forrest determined to push on ahead with one companion, obtain a supply of food, and then return to bring on the rest of the party. Accordingly they started from the camp with full water drums and a few pounds of flour, and commenced a hundred miles' journey, which nearly cost them their lives. The blazing heat of a tropical sun dried up their store of water, and for forty hours they suffered the agonies of thirst. They pushed on night and day for bare life, while their senses began to reel, and each man's tongue swelled up so that it nearly choked him and fairly rendered him speechless. Swallowing a stone gave them relief at first; but by and by the salivary glands refused to work, and the stones dropped out as dry as when they were put in. At last, to their horror, the horses became disabled, and the two men had to dismount and toil on, leading their jaded beasts. But Forrest had taken his bearings well; and after a walk of 2 miles they struck the line, and proceeding along it for 3 miles more they got water. Having procured supplies of provisions, they returned, and with the remainder of the party soon after reached the Catherine Telegraph Station, and on the 6th October, 1879, arrived at Port Darwin.

The western half of Australia has thus been traversed in four nearly parallel lines about 800 miles apart, while various shorter explorations have made known large portions of the intermediate country. The southern and northern coasts are also fairly known; and we are forced to conclude that at least one-third of the entire continent is at present uninhabitable by Europeans. Nowhere else, perhaps, on the globe, do we meet with the strange phenomenon of a dense vegetation combined with an aridity equal to that of the Sahara. For the traveller the country is worse than the Sahara. For hundreds of miles at a stretch the sandy undulations are covered with the dreaded spinifex or porcupine grass, which renders it impossible to walk without painful precaution. Again, for hundreds of miles is found the dense "scrub" of dwarf Eucalyptus, covering

the ground like the rods of an osier bed 10 or 12 feet high, hindering all view of the country, and rendering it necessary to bore one's way, like a mole, underground. This is the "Mallee scrub" of the explorers; while the still more dreaded "Mulga scrub" consists of species of prickly acacia, which tear the clothes and wound the flesh of the traveller. Horses dread the spinifex as a pestilence. The constant pricking of this grass causes raw and bleeding swellings round their feet, and to escape from it they will prefer to force their way through the densest scrubs, where the ground is soft and the spinifex does not grow. In other parts the whole country is a mass of angular stones, without the traveller meeting for days together with a spot of easier ground; while over large tracts of country loose sand is heaped up in ridges, like the long swell of the ocean, and appearing almost as interminable. Often, after passing days without water, when at length it is discovered it turns out to be undrinkable brine, or it exists in such small quantity as to be insufficient to supply the wants of both men and horses for a single day. Again, the extreme uncertainty of the climate and rainfall renders it impossible to depend on the accounts of previous explorers in the same district. Where water is at one time abundant and herbage luxuriant, there may be found a year or two later a burned-up desert. The lake described by one traveller may be found an expanse of baked mud by his successor; while, where one marched over grassy plains, another may be stopped by inundations which cover the whole country.

It must not be supposed, however, because an isolated party of explorers passes through an inhospitable tract of country that therefore the whole region is *hopelessly* desolate. What has been achieved in many parts of Australia by the indomitable energy and spirit of the colonists entirely forbids such an idea. The country in which Burke and Wills died of starvation is now occupied by sheep runs, and is found to possess all the physical conditions necessary for supplying human wants. The region traversed from south to north by McDouall Stuart was of the most unpromising kind, as he was frequently in danger of perishing from want of water. Yet the overland telegraph, which nearly follows his route, marks a belt of fine fertile country, and with its stations at various intervals provides a good base of operations for settlements, both east and west. Queensland, at first regarded as far too hot for pastoral purposes, is now studded with settlements, 3,000,000 cattle, and more than 7,000,000 sheep. Australian natives, by their almost instinctive facility for finding water, will live for months where Europeans would die of thirst; and on finding one of the deserted water-holes of the natives, containing seemingly but the scantiest supply for a horse and man, Colonel Warburton was often able, by a little careful digging, to discover ample water to supply his party and seventeen camels a considerable time. When once these watering places are thoroughly known, the presence and appliances of civilized man will effect unreamed-of transformations. Oases will arise in the deserts; and even if this appellation be still deserved by the more central regions of Australia as a whole, other generations will see marvellous changes produced therein by the dissemination of perennial grasses, clovers, lucerne, and numerous other fodder herbs, and by draining into permanent basins the moisture which now, after occasional rainfalls, so rapidly evaporates.

It would, indeed, be impossible to predict the future which lies before this sturdy and colossal colony, especially considering what it has already accomplished while yet in the infancy of civilized life. At no very distant period a railway will in all probability span the continent from north to south. Expeditions to ascertain the practicability of this great scheme were despatched in 1880-82, and each arrived at the conclusion that it might be carried out without any insuperable difficulty.

Physical Geography.—Australia is singularly compact, and when its vast extent is taken into account, presents no great variety of surface or irregularity of outline, there being no remarkable indentations except the Gulf of Carpentaria on the N.E., though there are several good harbours and capacious bays. A ridge of rugged mountains, none of whose elevations exceed 7000 feet, runs parallel to a great portion of the E. and part of the S. coast, at a distance varying from 30 to 90 miles; while the S. coast, from Cape Leuwin to Spencer's Gulf, presents a low and sandy surface. The N. and W. coasts are generally low, with some moderate elevations at intervals.

The most elevated range of mountains extends along the E. coast, at distances, as before stated, of from 30 to 90 miles. They are named by the natives Warragongs, and by the settlers Australian Alps. They are subdivided into the Blue Mountains, and the Liverpool, Denham, New England, and Peak ranges. The chain commences near Cape Wilson, the most southern point of the continent, and extends with little interruption to the northern shore. The highest peaks—viz. Mount Kosciuszko, 7176 feet; Mount Sea View, 6000 feet; Mount Lindsay, 5700 feet; Mount Dargal, 5490 feet; Mount Canoblas, 4610 feet; Mount Mitchell, 4100; Mount Pinnabar, 4100 feet; and Mount Bathurst, 4000 feet—are all in New South Wales, except Mount Kosciuszko, which is on the border between New South Wales and Victoria. These mountains, though not attaining the altitude of the great summits of the other grand divisions of the world, on account of their abruptness, present scenes of great wildness and grandeur, exposing to view immense precipices and gigantic fissures, with nearly perpendicular walls of from 1700 to 3000 feet. Some summits are perpetually covered with snow. Another range, commencing near the S. coast, at Portland Bay, in lat. 36° 52' S., lon. 142° 25' E., after a N. course for some distance, sinks into grass hills, which connect it with the Australian Alps. Another chain runs N. from Cape Jervis and South Australia to Lake Torrens, and there are also several detached ranges and isolated peaks. On the S.W. runs a range under various local names, none of which exceed 3000 feet in altitude.

The explorations we have sketched, and our remarks thereon, sufficiently indicate the dreary character of much of the interior. Allowing, however, that 1,000,000 square miles of the country is hopelessly irreclaimable desert, there yet remain nearly 2,000,000 square miles—an enormous area—which the patient energy of man will render usefully productive. One chief characteristic of the interior is the great flatness of large areas of its surface, and the moderate elevation of even its highest ranges, and this will very largely account for the deficiency of a regular and perennial water supply, presently to be noticed. After excessive rains some of the plains are converted into a shallow sea, which, however, soon disappears, and in an almost incredibly short time the ground is clothed with verdure. In the north the climate and productions are of a more tropical nature, and rain is more regular.

A scarcity of fresh water, whether in the form of rivers or lakes, is one of the prevailing characteristics of Australia. Along a coast line of nearly 8000 miles, few rivers of any considerable magnitude discharge themselves into the sea, most of them being absorbed before they reach it, while on the S. coast there is not a single watercourse to be found from Port Lincoln to King George's Sound, a distance of more than 1500 miles. The Murray, with its great branches, the Murrumbidgee, Lachlan, and Darling, is the principal river of Australia. It runs mostly in a W. and S.W. direction, and drains the western slope of the Australian Alps, through a space of from 800 to 1000 miles from the sources of the Murray on the S. to those of the Darling on the N. For a long distance it forms the boundary between Victoria and New South Wales. The

other rivers are the Manning, Clarence, Brisbane, and Burnett on the E.; the Fitzroy and Burdekin on the N.E.; the Mitchell, Gilbert, and Gregory on the N.; the Adelaide and Victoria on the N.W.; and the Fortescue, Gascoyne, Murchison, and Swan River on the W.

The flow of water in the Australian rivers is very unequal, and notwithstanding the great length of their course many of them, especially in the S.E. of the island, are in general of the nature of mountain torrents. Formed in the hills by the confluence of many powerful streams, they rush from their mountain homes important water-courses; but quickly reaching a level country they become sluggish in their motion, except when urged by the influence of flooding rains; and receiving few or no tributaries, their existence depends on the magnitude of their sources, so that they shal and narrow as they proceed—an effect exactly the reverse of anything observed in older countries. When the mountains are saturated with water the beds of these streams become fully charged, and then they foam and thunder along their tract till, in the flats of the low country, they meet with some opposition, when they overflow the country to the right and left, and render it a vast marsh. In dry seasons, on the contrary, many of the rivers dwindle to trifling brooks even in the mountains; while, in the plains, their wide and deep beds become converted into dry and dusty chasms. This is the case with the Macquarie and the Lachlan, which, issuing from the mountains in large and full streams, are lost in extensive swamps, which in wet seasons are everywhere inundated. After a long-continued drought the beds of these rivers present a succession of ponds, and their marshes, nearly or wholly dried, exhibit the creeks by which their imperfect communication is kept up during the inundation with the Darling and Murrumbidgee. The Murray, from the number of its affluents, and also from the nature of the country through which it passes, never loses the character of a continuous river—though at certain seasons its waters are considerably reduced, and it is not always available for navigation. Its embouchure, too, is very disproportioned to its magnitude, but that effect has to some extent been overcome or much modified by the assistance of railways. The fitful and irregular character of the streams is accounted for, to a great extent, by the level surface of the country already referred to. The intersection of lofty ranges of mountains in a country generally gives rise to streams flowing with regularity and in considerable volume.

Lakes are abundant in Australia, as might be inferred from the level nature of much of the country, but none of them are very large, and few are permanent. The ideal Lake Torrens of earlier Australian geography, situated near the Flinders range in South Australia, has been discovered to include a chain of lakes, distinct from one another, to which the names of Eyre, Gregory, Frome, and others have been given. With the restricted limits now ascertained to belong to it, Lake Torrens still extends upwards of 150 miles in the direction of N. to S., and has its drainage into the head of Spencer Gulf, though divided from it during the season of drought by an intervening isthmus. Lake Alexandrina, the recipient of the Murray, has a very large surface, but is shallow. Lake Amadeus is a great saline depression near the heart of the continent. Some of the lakes are, however, quite isolated, and none have any outlet. Many, including some of the largest, are salt.

Zoology.—Australia stands alone as respects the mammalia which inhabit its surface. Almost all—kangaroos, bandicoots, opossums—belong to the marsupial type, that is, are furnished with a natural pouch in which to carry their young. These marsupial animals, which are now extinct in almost every other part of the world, or but feebly represented (as by the opossums of America), are considered to be the oldest mammals known. Fossil remains prove that their predecessors in ages past grew to enormous

sizes, rivalling that almost of the rhinoceros. The "dingo," or wild dog (more than suspected to have originated from escaped dogs of the early European settlers), is almost the only carnivorous animal of the continent, and there are no indigenous hoofed animals. The birds of Australia stand unrivalled in their variety of form and beauty of plumage. There are upwards of 680 different species—the largest being the emu, which represents in Australia the ostrich of Africa, and ranks next to it in stature, many standing full 6 feet high. The birds of prey—eagles, falcons, hawks, and owls—are plentiful; with those of beauty, paroquets, cockatoos, and lorries; but in birds of melody the country is deficient. The notes are more generally monotonous, discordant, or peculiar than musical; and many are familiarly styled after their tones. The black swan, remarkable for its colour and glossy plumage, has a voice which one of its early civilized hearers could only compare to the "creaking of a rusty sign on a windy day." The black swan, honeysucker, and lyre-bird are peculiar to the country. The bell-bird has the name from its single silvery "ting," curiously loud and metallic, the harbinger of water in the desert. The organ magpie has a soft sad tone, said to resemble the notes of a flutina touched by a timid and uncertain hand. The coachman gives a long clear whistle, finishing with a noise exactly like the crack of a whip. The knife-grinder's song is sufficiently discriminated by the name. The extraordinary chant of the laughing jackass defies description. Several species, as the talagalla or brush turkey and the satin bird, are remarkable for their habits. Snakes are abundant, and though not of large size are very venomous in character; there are upwards of sixty species. The rivers within the tropics harbour formidable crocodiles; and various lizards, especially the iguana, attain a large size. In the insect world Australia occupies a foremost position, whether as regards size, number, peculiarity, or activity—the latter quality being conspicuous in the mosquito. An endless variety of fish, seals, dugongs, and whales are found along the coasts.

Botany.—There is no part of the world the vegetation of which is so unlike that of all other countries as that of Australia. The plants are, to a very considerable extent, of so peculiar an organization that a large proportion of the genera and some entire natural orders are absolutely unknown beyond its shores or dependent islands. Trees are there the leaves of which are on both sides alike, and possess the same organs, with the further peculiarity of being inserted in a vertical instead of a horizontal direction. Hence by presenting their edges to the light but little shade is afforded. This result is aided by the foliage of all the timber being scanty, while the branches tend more to shoot upward than to spread out laterally; and the trees are often thinly distributed over the surface, or arranged in park-like clumps, instead of forming a continuous forest. The woods have therefore no glades of profoundest gloom, but are light and airy scenes. Yet a desolate appearance is given to them by some species which have long wiry branches entirely leafless, and by others which annually shed their bark. Streamers of this epidermis may be seen, 20 or 30 feet long, hanging like "a beggar's garment from the stems, or rolled up on the ground precisely like great sticks of cinnamon."

The two families of Eucalypti and Acaciæ are predominant among the vegetation. The former are the "gum-trees" of the colonists, so called from their resinous exudations. The latter are the "wattle-trees," some species of which were used by the early settlers for the purpose of wattling the partitions of houses. Valuable timber-trees rise to the enormous height—unsurpassed in any part of the world—of from 450 to 500 feet. One monarch of the forest was blown down in Gipp's Land in 1880, and measured 480 feet as it lay. The huge gum-trees and

various kinds of pine yield very fine timber, strong, intensely hard, durable, admirably adapted for constructive purposes, and in many cases beautiful of grain. Cedar is very plentiful in the northern parts, and is much used for domestic fittings, furniture, &c. A nettle, *Urtica gigas*, rises to the height of 40 feet, and has a stem 9 or 10 feet in girth, with large leaves, the sting of which is said to be painful enough temporarily to paralyze a limb. In the more northern districts palms, bananas, and other tropical productions connect the vegetation with that of South-eastern Asia. The fan or cabbage-palm occurs on the east coast in the Illawarra, a belt of land 60 miles south of Sydney, but is not seen in the interior. A slender branchless stem, from 60 to 100 feet high, surmounted with a crown of leaves, waves gracefully to the breeze as it rustles through a round tuft of foliage at the top. The leaves are made into a kind of hat very generally worn by the colonists, and the tuft at the summit is eaten by the natives—whence the name of cabbage. Owing to these uses the beautiful tree has been subject to reckless destruction in the district, and is now scarce. The edible and fruit-bearing plants indigenous to the soil are few in number, and of no importance to civilized man, either for food or the gratification of taste, though several afford useful provision to the aborigines, and it is possible that some grasses of the pastures might be introduced to cultivation with advantage in dry climates for the support of stock. Mere flowering-plants are numerous, worthy of the florist's care as objects of beauty or curiosity, though most are scentless. Such is the Waratah or native tulip, a tall, stately, and right regular-looking product, growing on the slopes of the hills, well entitled to be called the Queen of the Bush. Its woody stem rises straight as an arrow from 5 to 10 feet high, and is clothed all the way up with richly-green oak-like leaves, which are surmounted by a noble cone of vivid crimson. The gigantic lily or spear flower has a stem of 15 or 20 feet, rising from the centre of a group of long, broad, curving leaves, which is crowned with a huge cluster of gorgeous crimson lilies. Of the humbler but more useful vegetation, as the succulent natural grasses, they do not uniformly clothe the surface by forming a continuous turf, but grow in separate tufts like the strawberry-plant, with spaces of bare ground between them. A minute pink convolvulus, and a hardly kind of everlasting with a yellow flower, intermingle with the herbage, and occupy the place of our daisy and buttercup.

Vast accessions have been made to the botany and zoology as the consequence of colonization, and are still in process. All the cereals grown in Europe are raised, with the usual green crops for cattle and garden vegetables for the table. Some of the latter are produced in greater perfection than in the mother country, as the cauliflower and the broccoli, while a few degenerate, such as the bean. The more valuable may be sown or planted at any time with the certainty of a good crop, and hence Sydney possesses what London cannot boast, a supply of green peas throughout the year. Australian wheat has for years had an excellent reputation on the London markets, where it commands an exceptionally high price. Tropical products, such as sugar, maize, tobacco, and cotton are cultivated with complete success in Queensland and the north-eastern parts of New South Wales. The vine flourishes luxuriantly, as well as the olive; and the choicest fruits of warm latitudes are reared—the orange, lemon, citron, almond, loquat fig, and pine-apple. The domesticated live-stock, introduced towards the close of the last century, which might then be represented by a few units, have multiplied by many millions; until Australia is more plentifully stocked with sheep and cattle than any other country in the world, and in the fleece of its sheep possesses a source of wealth far exceeding even its marvellous production of gold. Another experiment in acclimatization has also been

attended with very gratifying success. To give home melodies to the fields, woods, and gardens, blackbirds, thrushes, larks, and other songsters have been imported and turned loose; with some game birds, as pheasants and partridges, for the benefit of sportsmen, and the improvement of the table. A few camels, obtained from India, are in the colony of Victoria; but by far the most important addition are llamas and alpacas from Peru. Jealous of other countries possessing such wealth-producing animals, the Peruvian government issued an edict in the year 1846 prohibiting their export; and the penalty was imposed of forfeiture of the flock, and of ten years' labour in chains at the Chincha Islands, on any owner or driver found with them within a certain distance of the coast. In spite of this enactment, through the enterprise of Mr. Ledger, a large flock was landed at Sydney in November, 1858. The alpacas spent the first year of their colonial existence at Sophienburg, about 23 miles south of the city, where fleeces such as Peru had never seen were taken from them in

November, 1859, and where the first alpaca meat killed in Australia was partaken of on the 7th of September, 1861, by a party of colonial notables. A premium was for some time offered for the introduction of salmon into the rivers of Tasmania. Several failures were made in the attempt to transport the ova, but success ultimately crowned the effort, previous to which trout, salmon, and the other Salmonidæ were absent from the whole of the Southern Hemisphere.

Geology, Minerals, &c.—The interior of Australia consists in a great measure of tertiary formations, surrounded by an unbroken chain of igneous and metamorphic rocks. To the west occur the carboniferous rocks, containing extensive beds of valuable coal. Palæozoic strata are found on the eastern coast from Capo York on the north to Victoria on the south.

Volcanic indications are far from numerous. The only extinct volcano of any importance is Mount Gambier in South Australia, which may roughly be described as a



Volcanic Lakes and Mountains, South Australia.

series of craters extending nearly east and west, and three of the craters being occupied with lakes or pools of the most romantic character. These are known as the Blue Lake, Middle and Valley Lakes. The Blue Lake is a large and deep body of water of irregular oval shape, shut in by steep wooded banks, some 200 feet in height. The Middle Lake is of smaller area, and of moderate depth. The banks are not precipitous, but slope all round to the water at an equal inclination, are covered with rich grass, and studded with sheu-oak and honeysuckle. Closely adjoining is the Valley Lake, separated from it by an undulating ridge of woody ground. It is the largest of the three, and of almost circular form; but from its shallowness in the west, seems like a chain of ponds rather than a uniform basin. Its crater walls are remarkable for their irregularity.

Immense deposits of fossils have been discovered, consisting of little else than shells, so that vast tracts of

country now dry land must at some remote date have been submerged beneath the ocean. The chalk cliffs of the Great Australian Bight are surprisingly rich in these memorials of a dim antiquity; and those of the Murray River and Mount Gambier exhibit a similar fossiliferous formation.

Numerous clefts and caves occur in the limestone strata of New South Wales, Tasmania, and South Australia. There is a remarkable series about 25 miles to the north of Pinola, in the latter colony, noteworthy for its magnitude and internal beauty. These are the *Blanche Caves* of the Mosquito Plains. They are entered by a small aperture on the summit of a hill. Descending by a small sloping path to a depth of about 25 feet, the traveller suddenly emerges upon a scene of surpassing brilliancy. The cavern is about 190 feet long, about 45 feet wide, and 20 feet high. Its roof and walls are enriched with the most glorious natural decoration of limestone stalactites, like the

tracery and devices of a Gothic cathedral. Pillars of every shape cluster in small groups, like garlands of flowers, and at intervals occur large columnar masses tinted by almost every variety of colour. The second cave is smaller, and so studded with stalactites and stalagmites as to resemble a dense avenue of statuary and fantastic images. There are several other caverns, and each appears to possess an interest and a beauty of its own.

Bones of extinct animals have been found in large quantities in these subterranean recesses, as well as the remains of individuals of existing genera. In the latter case the bones are generally larger than those of the modern types.

Many of the products of Australia are being made available in the useful arts. Sand occurs which has been found of great value in the glass manufacture. Building stone of various kinds, very fine descriptions of marble, potter's clay, and roofing slate are found in abundance. The colonists are also working valuable deposits of gold, copper, tin, iron, coal, and lead. The gold has been chiefly obtained from the "diggings" in the detritus of ravines, or in the beds of streams descending from the mountains. It has been found in every form, sometimes as mere grains or dust, sometimes as flakes or scales, and on some occasions large nuggets or lumps, weighing from 1 oz. to 1000 lbs. The separation of the small particles from the earth is effected by repeated washings, and from the quartz rock by breaking, crushing, or trituration. Coal has been for a long time known in New South Wales, and is extensively worked in the basin of the Hunter River, where several beds crop out at the surface. It also occurs in Western Australia, near Perth. The discovery of copper in South Australia dates from the year 1842. Immense masses of ore of the richest quality have been obtained, and lead is abundant in the same district. Iron exists in such profusion in several of the mountains on the north coast that they violently affect the magnetic needle. Manganese, zinc, quicksilver, and antimony have likewise been met with, as well as good specimens of the gems used in secondary jewellery, jasper, chalcedony, and opal.

Climate.—The climate of Australia has its special characteristics, among which the most unfavourable is the protracted droughts, occurring at intervals of about ten or twelve years. While these endure the soil grows calcined as in a furnace, vegetation perishes, streams dry up, and thousands of cattle perish from lack of nourishment. These droughts are succeeded by very heavy rains. Another peculiarity is the sudden transition from heat to cold. Instances are recorded of the thermometer having varied twenty-five degrees in fifty minutes. The swift changes of the wind account for these violent alterations. The north-westerly breezes, sweeping over the interior during a period of drought, attain such a degree of heat that they become like an African simoon, too scorching for the comfort of men or animals, and destructive to all vegetation. The thermometer then leaps suddenly from 80° to 110°, and even higher. But on the other hand, the winds from the south-east are frequently very cold and biting, especially when they quickly follow a hot north-western wind.

Tables of average temperature show that Sydney has a climate analogous to that of Lisbon, and Melbourne to that of the south of France. The vegetable products point to the same conclusion. The orange ripens freely at the former, and only in exceptional places in the latter. Strictly speaking, our remarks respecting the extremes of temperature apply to districts towards the interior, where, indeed, the heat is often like that of a furnace; and neither here nor in Queensland, where the climate is tropical, will Australia ever carry a very dense European population. Now South Wales, South Australia, and Victoria suffer during the summer from "hot winds." These generally last for a few hours, but occasionally blow for three days, always subsiding at night. No perfectly satisfactory

explanation has been given of what causes them. Some persons find them very oppressive, but they are never allowed to interfere with ordinary occupations, and medical men do not consider them to be unhealthy. They are almost always terminated by a "southerly burster," which brings a rapid and severe change of temperature, usually accompanied by a storm of rain. From the rather wide alterations which occur it must not be inferred that the climate is disagreeable. On the contrary, that of Tasmania is very near perfection, and in Sydney and Victoria more really enjoyable weather is experienced than in most places. On the whole, settlers find the climate remarkably healthy and salubrious, well suited, with the exceptions mentioned, for Europeans.

Inhabitants.—The aborigines of Australia belong to two races—the Malay, and another which seems to constitute a separate division of mankind, and from its negro-like characteristics has been named the Australian or Austral negro. A similar race is found in Papua. They are sometimes considered a branch of the African negro, whom, however, they resemble only in the colour of the skin and their woolly hair. Even their skin is not a pure black, like that of some of the Africans, but more the colour of chocolate. The height of the males generally averages from 4½ to 5½ feet; the head is small, the trunk slender, the breast usually arched and well developed, the arms and legs of a rounded and muscular form, the foot flat, and the heel somewhat protruding. A low forehead, large eyes far apart, a broad flat nose, with thick lips and large white teeth, make up a visage which is not peculiarly prepossessing. It was the habit of the early explorers of Australia to represent its aboriginal inhabitants as lost in a state of hopeless degradation, and as physically, morally, and mentally inferior to the lowest races of mankind. But in this unfavourable picture there was considerable exaggeration. Some of the tribes exhibit a fair degree of intelligence, and all seem capable of improvement and elevation under the refining influence of a Christian civilization. Captain Sturt met a tribe who had never seen a white man, but who possessed an intimate knowledge of freemasonry, and gave the sign only known to the mystic brotherhood. Mr. McDouall Stuart, when exploring, met with a similar experience. When he returned the sign the native patted him on the shoulder, stroked his hand, and gave other signs of pleasurable and brotherly recognition.

The males in many tribes go entirely naked; the women are usually clothed with opossum skins. They construct temporary habitations of the branches and leaves of trees, but the want of water and the scarcity of food compel them to a nomadic life—each tribe, however, confining its wanderings within certain limits, and never transgressing the bounds which separate it from other tribes. Their food is mostly of an unsavoury description, such as grubs, worms, snakes, lizards, or any kind of refuse. A kangaroo, an opossum, or a bird forms a rare and highly appreciated delicacy; and the coast tribes also feed on turtle and shell-fish. From this surprising scantiness of provisions the native races are rapidly dwindling in numbers, their decline being accelerated by the encroachment of the white man on all their habitable territories, so that before many years have elapsed they will probably have wholly passed away from the face of the land, and left no single monument or memorial to tell that they have been. In Tasmania this is actually the case, the last of this unfortunate branch of humanity in that island, an old woman named Truganina, having died in 1876, at the age of seventy-three.

The principal proportion of the settlers are, as might be expected, from the British islands, but the native-born population is now a very considerable section. There is a large Chinese element in Queensland, where, owing to the tropical climate, Europeans are not so well suited for the development of the fine resources of the colony. The

"heathen Chinese," against whom there is no little prejudice, is also found, to the number of about 15,000, in Victoria. Next in number to these is the German element, which in some parts, especially in South Australia and Queensland, is largely represented. There is no deterioration of the British race here, such as has been remarked in some parts of America, and any change in the physical development of the native-born seems to mark an improvement. All manly sports are pursued with enthusiasm, and in cricket matches with the best players of the mother country the colonial youths have more than maintained their character.

Divisions, Settlements, Population, &c.—The English are the only colonists who have founded settlements on the

continent of Australia. The order in which they were respectively established was—1, New South Wales, founded as a penal colony in 1788; 2, West Australia, established 1829; 3, Victoria, so named in 1851, but colonized as "Port-Philip" in 1835; 4, South Australia, settled in 1836; 5, Queensland, established 1859, having formerly been known as the Moreton Bay district of New South Wales. The island formerly called Van Diemen's Land forms a separate colony, under the name of Tasmania. Each settlement is fully described under its separate head; but the following are a few of the more important statistics relating to them, compiled from the latest official returns:—

	Area, Square Miles.	Population in 1881.	Revenue.	Public Debt.	Shipping Entered and Cleared.	Imports.	Exports.
				£	Tons.		
New South Wales, .	310,937	781,265	4,905,000	14,000,000	2,541,000	13,951,000	15,526,000
Victoria,	87,884	882,232	4,622,000	22,000,000	1,941,000	14,557,000	15,955,000
South Australia, .	903,690	286,321	2,028,000	9,870,000	933,000	5,582,000	5,575,000
Western Australia, .	1,024,000	32,359	180,000	361,000	171,000	354,000	500,000
Tasmania,	26,215	118,923	440,000	1,944,000	382,000	1,370,000	1,512,000
Queensland,	669,520	226,968	1,613,000	12,192,000	1,257,000	3,088,000	3,419,000
TOTAL, .	3,022,246	2,328,071	13,788,000	60,367,000	7,225,000	38,902,000	42,517,000

The value of the gold annually exported from Australia is nearly £8,000,000, of which nearly £6,000,000 is raised in Victoria. The exports of wool amount to over 300,000,000 lbs., the value of which was upwards of £16,000,000. About half is sent from Victoria. The chief articles of import are beer and ale, corn, spirits, sugar, tea, textile fabrics, and wearing apparel.

The development of the Australian colonies was at first slow, doubtless owing to the ill favour imparted by the transportation system. Almost concurrently, however, with the discontinuance of the practice of sending convicts thither from England there came news of the finding of rich fields of gold. A great stream of emigration at once set in, and the new enterprise threw every other consideration into the shade, and excited as complete a dislocation of industrial habits, and of the general value of commodities, as attended a similar discovery in California. The first discovery of the precious metal was made in the neighbourhood of Bathurst, about 120 miles N.W. of Sydney (May, 1852). In a few days there were no less than 4000 persons employed at the diggings, and £25,000 worth of gold was collected in one week. Another discovery, 30 miles south of Bathurst, soon followed; and at length numerous other gold-fields were discovered and explored in different parts of Victoria. The original discoverer was a Mr. Hargreaves, who afterwards received a reward of £10,000. The effect of this immense addition to the material wealth of the country was most important. The demand for labour, as well as the prices of lodging and food, and the payment for labour, were all increased in an unprecedented degree, in some instances quadrupled. The principal part of the emigration was directed to Victoria and New South Wales, but throughout the whole of Australia trade and population made wonderful advances.

Sheep and cattle farming and the production and export of wool are also industries pursued on an enormous scale, and now far outrival in value the produce of gold. A "squattage," as it is called, occasionally comprises from 1000 to 2000 square miles, though more commonly from 200 to 500; or in acres, from 120,000 to 300,000 or 400,000. Wine is a somewhat promising item of colonial produce, as the exports of this article are largely and rapidly increasing.

Times have indeed wonderfully changed since Lamb called Australia the "Paradise of Thieves," and Sydney Smith ridiculed it as a "region in which nature has been so capricious that she makes cherries with the stones outside, and where a monstrous animal, as tall as a grenadier, with the head of a rabbit and a tail as big as a bedpost, goes hopping along at the rate of five hops to a mile." The satire is curious if we call to mind the immense strides made by this great country in the last half-century. Its total population in 1830 was but 70,581; in 1883 it was 2,299,000. The commerce rose from £1,000,000 in 1830 to more than £80,000,000 in 1882. Instead of 116,000 acres in cultivation, there were at the latter date 4,000,000 acres; the export of wool had increased from £65,000 to the annual value of £16,000,000; and the 57,000 tons of shipping employed had grown to 7,200,000 tons; while the public revenue, which was £153,000 in 1830, had in 1882 become £14,000,000. Considering the vast resources of the country, the possibilities before it are indeed immense. An island-contin- nt of 3,000,000 square miles, it has a population below that of Switzerland, and only about half that of Ireland. Land is so cheap that in 1881, in the northern country of South Australia, 1775 square miles were sold for £8000! The climate ranges from that of the north of France to that of Egypt, Algeria, and Morocco. It is a virgin soil, girdled by the ocean, comprising the best of the tropical regions, and increasing the natural healthfulness of all. It contains some of the finest pastures in the world; it is exceedingly rich in mineral wealth; its wheat, wine, and wool have no superiors; and there is little doubt but that it could abundantly clothe and feed 60,000,000 people within its own limits, and still have a surplus available for export adequate to the wants of 100,000,000 of people in the Old World. Immigrants from the mother country find congenial association amongst a people more thoroughly English than the English themselves, and in many of the towns there is nothing but the broader streets, the brighter sun, and the newness of the public and private buildings, to efface from a new arrival the impression that he is still in an English city.

Education, generally speaking, is free, compulsory, and secular, though not to the exclusion of Bible reading; secondary education is provided for by numerous colleges,

grammar, and high schools; and higher education by the universities of Sydney, Melbourne, and Adelaide, each of which have power to confer degrees which have equal value to those of the home universities. No religious communion is established by law. Public affairs are administered in each colony by a governor of imperial nomination, assisted by a parliament, which consists of a council and an assembly.

AUSTRIA-HUNGARY, EMPIRE OF. Since 1867 Austria and Hungary have been two distinct kingdoms, united by having a common ruler of the German house of Hapsburg, as well as in external policy and in military affairs. The empire is sometimes called the Cis-Leithan and Trans-Leithan monarchies, the Leitha being a small stream which joins the Danube from the south, and forms part of the frontier between Austria and Hungary. Austria-Hungary belongs to the Germanic group of European states because the dominant race is German. The Germans, however, form little more than one-fourth of its varied population.

The whole country lies between 45° and 52° N. lat., and 9° and 27° E. lon., occupying an area of 241,000 miles, the circuit of which is estimated at nearly 5000 miles. In point of area Austria-Hungary ranks second among European states, Russia alone being larger. It is rather more than four times as large as England, its extreme north and south points being nearly 700 miles apart, its east and west extremities nearly 900 miles distant from one another. Italy, Switzerland, and Bavaria are contemporaries with Austria on the west; Prussia and Russia lie north and north-east; Roumania lies south-east of Hungary; Serbia and Montenegro to the south. The peninsula of Istria, extending into the northern Adriatic, with its gulfs on each side, is the only maritime portion of Austria proper; but to reach this the great barrier of the Eastern Alps must be crossed. The steep and rocky shores of Dalmatia belonging to it are almost isolated from the rest of the empire. While embracing within these bounds numerous nationalities differing from each other in race, language, customs, religion, and degree of civilization, with great diversity of soil and climate, the Austrian dominions form in the main a compact oblong territory, with well-defined natural frontiers in general, consisting of chains of mountains, great rivers, and the sea. The limited maritime accommodation, with the fact of high mountain ranges intervening between the greater part of the productive area and the shores, is the main natural disadvantage of the empire.

Physical Features.—Austria-Hungary has been well termed "the Empire of the Danube," since it lies for the most part within the basin of that river, and embraces the whole of its upper plain, which lies at an elevation of about 300 feet above the sea. The territory, however, comprehends great superficial diversities. Within its limits are the vast flats of Hungary, the gently swelling surface of Bohemia, the fertile plains of Moravia, and the steppe-like undulations of Galicia. But towering highlands and hilly ranges are more prominent, occupying full three-fourths of the area.

On the west Austria embraces nearly half of the great mass of the Alps between the plateau of Bavaria and the plain of Lombardy, the mountain and valley scenery of Tyrol and Salzburg resembling that of Switzerland on a lesser scale; the highest point of all here is the Ortler Spitze (12,817 feet). An eastern outlier of these heights—the Bukony Wald—runs into Hungary, compelling the Danube to form a sharp east-to-south bend or knee in its course. In the north-west the Böhmer Wald, the Erz and Riesen Gebirge (Schneekoppe, 5254 feet), the Sudetic Mountains, and the Moravian Heights, inclose the high basin of the Upper Elbe in Bohemia. These mountains in fact form a rampart around Bohemia, separating it from the rest of Germany; the Sudetic Mountains divide Moravia from Silesia; and the wooded Carpathians sweep in a huge semicircle around the north of Hungary, leaving the Danube

near Presburg, and after performing the curve returning through Transylvania again to the river on the Roumanian frontier.

Waters, Lakes, Rivers, and Canals.—The only sea coast which this great empire possesses is on the Adriatic, the waters of which, so far as the Austrian dominions are concerned, extend from the western, southern, and eastern frontiers of the government of Trieste in Illyria, the "littoral" of Hungary and Austrian Croatia, and the western limits of Dalmatia to their most southerly extremity. In describing this line, the Adriatic not only makes two large bays or inlets—the Gulf of Fiume or Quarnero and the Bay of Cattaro—but forms several narrow straits called canals, between the islands and mainland in its north-eastern parts. Such are the Morakian Canal on the coast of Dalmatia, the canals of Pago, Zara, di Mezzo, Solta, Trau, Brazza, Cargola, Narenta, and others. This line of coast being, however, to a considerable extent cut off from communication with the bulk of the Austrian dominions by intervening mountains, over which the roads are difficult, the benefits which the Adriatic affords to Austrian navigation are almost entirely confined to the provinces immediately adjacent to it.

The two large lake-basins of the country, which seem to be remnants of much more extensive inland waters, lie in Hungary between the Danube and the Drava. The larger—the Platten See or Balaton Lake, 50 miles long, shallow and stagnant—overflows into the surrounding marshes only in spring; the Neusiedler See, further north, is now so dried up that its deeper hollows only are filled with water. In 1870 its bed was so dry that cultivation was extended over a great part of it. Lake Constance, on the northern margin of the Alps, and the Lago di Garda, on the southern, touch upon Austrian territory.

Of rivers the empire comprises the upper courses of the Elbe, Oder, and Vistula, which flow out of it to the northward into Prussia; the upper Dniester and the central Danube, which pass the frontier to the eastward into Russia and Roumania; the Adige and other swift-flowing streams, which descend to the southward from the snowclad heights of the Tyrol into Italy. The Danube, with its mighty arms, is the prime hydrographical feature, having a total flow of 850 miles in the Austrian dominions, navigable through the whole extent, and traversed by a large number of steamers and tugs. It crosses the border from Bavaria below Passau with a contracted width, but with great depth at that point, runs easterly by Vienna into the heart of Hungary, where at Pesth it has a breadth of 2000 feet. Having made an abrupt bend, it flows nearly due south to the Roumanian frontier, and from thence proceeds eastward again, forming the boundary line to Orsova, where it quits the empire at the gorge of the Iron Gates. It is the main highway of Austria-Hungary, and the great outlet to the Black Sea on the east. In winter the river is usually frozen over, and is the occasion of great disasters on the return of spring if the thaw is rapid and coincident rains descend. The great body of water brought into its channel from the melted snow furiously breaks up the ice with explosions resembling the discharge of artillery, tosses immense masses to and fro like straws, carries them ashore, and inundates the country for miles on either bank. In the spring of a recent year the whole region between Vienna and Pesth was thus destructively visited. Towns had to be abandoned in haste by the inhabitants to save their lives; cattle and flocks were drowned; houses and cottages fell from the flood sapping their foundations or loosening the ill-cemented materials of their walls; the winter seed was washed out of the ground; the drifted ice accumulated in places up to the roofs of the dwellings; and so suddenly did the inundation subside as to leave quantities of the large Danubian fish in pools behind it, and the peasants went fishing in the fields. In the course of its progress through the empire the Morava

or March, Waag, and Theiss enter the great water-course on the left bank, with the Inn, Ens, Raab, Drave, and Save on the right. The Inn crosses the Grisons frontier above the pass of Finstermünz into the Tyrol, and then flows through Bavaria into Austria, where it joins the Danube at Passau, after a course of 320 miles. The Traun rises in Styria, and flows 110 miles to the Danube, which it joins near Linz. The Ens rises near Radstadt, and flows through Styria and Austria to the Danube at Ens, a course of 170 miles. The Save, the southern boundary river of Hungary, with a course of 440 miles, and the Drave, 400 miles in length, join the Danube in the south from the Eastern Alps, up to the base of which both are navigable. The Theiss, winding south through the plain of Hungary from its source in the Carpathians, is its great northern tributary, also navigable, and so full of fish as to be popularly described as "two-thirds water and one-third fish." It joins the great stream near Peterwardein, after a course of 740 miles, during which it receives numerous contributory streams. The March or Morava, from the Sudetic Mountains, corresponds to the Leitha from the south in forming part of the boundary between Austria and Hungary. The Waag rises in Hungary, and flows 270 miles to the Danube at Komorn. The Gran rises in the Hungarian Erz-Gebirge, and flows 161 miles to the Danube at Parkany. The Leitha rises in the Lower Ens, and passes through Styria into a branch of the Danube above Wieselburg, a course of 80 miles. The Raab flows 170 miles from Mount Reehberg in Styria to Raab.

Parts of the northern dominions of Austria are connected with the Baltic and the North Sea, through the Vistula, the Oder, and the Elbe. The Vistula originates in the Beskide range, in Austrian Silesia; and after flowing for about 195 miles through the Austrian dominions, and attaining in some parts a breadth of 1700 feet, it enters Poland. The Oder rises near Olmütz in Moravia, and flows about 50 miles through that province before it enters Prussia. The Elbe rises on the north-east frontier of Bohemia, and flows about 160 miles before it enters Saxony. The Moldau, one of the tributaries to the Elbe, flows 220 miles through Bohemia. The Rhine touches the Austrian dominions only as far as it divides Vorarlberg from Switzerland.

The canals which exist in the Austrian dominions are of limited extent, and merely local in their advantages; for their object in general is merely to facilitate the communication between one particular district or town and another. Their whole number is not more than thirty-five, and their entire length does not exceed 500 miles. The chief among them are the Bega, the Emperor Francis' Canal, and the Yarsgina, the Neustädt, and the Schwartzburg canals.

Climate.—Though from the variations of elevation the climates of different parts of Austria-Hungary are very diverse, three broad divisions may be recognized—(1) the climate of the countries which lie north of the Carpathian heights, in which the winters are long and cold, and in which the vine does not flourish; (2) that of the central plains and slopes of Hungary, favourable to wheat and vines, and embracing the largest proportion of the area; (3) the Mediterranean climate of the Adriatic shores, which yield oil and silk. If the climate of Vienna be taken as representing that of the central regions of the country, it will be found to be nearly the same as that of London on the average of the year; but its variation is much greater. During the whole month of January the temperature at Vienna averages two or three degrees below freezing point, and then the Danube may be crossed on the ice. The heat at mid-summer, however, is nearly ten degrees, on an average, in excess of that felt in England. The rainfall generally is somewhat less than in England. The north Adriatic coasts are subject, especially in summer, to the strong, cold, dry north wind known as the *bura*.

Generally speaking, all the mountainous borders of

Austria-Hungary are forest-covered, the woods occupying a third of the whole surface of those regions. The great plain of Hungary, on the other hand, is an open treeless steppe.

Agriculture and Produce.—The variety of soils within the Anstro-Hungarian empire is perhaps unequalled in any other European state. The cultivable region of the 238,148 square miles which constitute the area of these dominions may be estimated at 220,000, of which 210,000—being about 89 parts in every 100 of the entire area, or 96 parts in every 100 of the cultivable portion—have been rendered available. The largest quantities of wheat, barley, and oats are raised in Hungary, Galicia, and Bohemia. Rice is grown in Dalmatia and other southern provinces. Buckwheat, millet, pease and beans, lentils, rapeseed and linseed, as well as potatoes and other ordinary vegetables, are more or less cultivated in almost every part of Austria; nor is the supply of fodder for horses and cattle inadequate, in the growth of which, especially of clover and lucern, Styria, the Archduchy, Bohemia, and Silesia take the lead. Turkish: pepper, mustard, aniseed, ginger, truffles, hops, flax, hemp, indigo, saffron, madder, anil, and safflower are also among the vegetable products.

The principal medicinal plants cultivated in Austria are—rhubarb, which is raised in Styria, the Lower Ens, Bohemia, and Galicia; liquorice, a favourite article of growth in Moravia, and which is also gathered in the wild state in Hungary and Slavonia; manna, which abounds in the forests of Hungary and Slavonia; and spikenard, which is collected with much care in the mountains of Carniola, Styria, the Tyrol, and the Upper Ens. The white species of this plant is mostly exported to the Levant, where the Turks and Greeks make use of it in their baths on account of what they conceive to be its invigorating properties. An intoxicating spirit is distilled in Carinthia and Styria from gentian, which is found in most of the elevated regions.

The cultivation of fruit is carried to a great extent in every part except Galicia. Plums, damsons, filberts, chestnuts, figs, almonds, currants, raisins, pomegranates, limes, lemons, oranges, dates, olives, and melons are largely grown.

More than one-third of the available soil of the Austrian dominions is occupied by woods and forests, and timber is one of the staple productions. The more level districts grow the oak, beech, ash, alder, elm, poplar, lime or linden, birch, willow, and plantain; whilst the fir, pine, larch, cedar, and yew, and where these will not thrive, the dwarf-pine and juniper, seek the more elevated regions.

A large quantity of wine is annually made, of which Hungary produces nearly one-half. Tokay is a Hungarian wine, very choice, but small in quantity. Carlowitz is also highly esteemed.

The finest breeds of horses are reared in Transylvania and the Buckovina. Of horned cattle the choicest and best breeds are those reared in Hungary, Transylvania, and Styria. Poultry of all kinds is very abundant in all parts of Austria, but especially in the north-west of Hungary, where prodigious numbers of fowls, ducks, geese, and turkeys are reared. The Tyrol is celebrated for rearing canary birds. Game of all kinds is plentiful; and in the list of wild animals we find the bear, lynx, wolf, fox, marten, and chamois goat. The rivers abound in fish.

Among the other productions of the empire we may notice that tobacco is a monopoly engrossed by the department of finance in every province but Hungary, Transylvania, and the Tyrol. Of seed-oil, though the produce is very considerable in all quarters, enough is not manufactured for the consumption. Large quantities of olive-oil also are obtained from the south-western parts of the empire, particularly the neighbourhood of the Lago di Garda, Illyria, and Dalmatia.

Minerals.—The mountains are rich in mineral wealth, and some parts of them, in Bohemia and Hungary in the north, and in Carniola in the south, are about the most productive in Europe in this respect. Gold, silver, copper, lead, zinc, and nickel are present in large quantities; but the most important product of the mines is that of iron, which is found in every province except those which lie round the Adriatic, and most abundantly in Styria and Carinthia. Austria possesses numerous coal-fields, the richest of which are those of Bohemia, and it stands fifth among European countries in respect of the quantity annually mined. The Carpathian Mountains are incomparably prolific in salt. At the famous mines of Wieliczka (near Cracow), the largest in the world, where galleries, halls, and even a chapel have been cut out of the solid rock-salt, 1,000,000 cwt. of salt are annually raised. Salzburg, in the Tyrol, takes its name from the salt mountains of the vicinity. Precious stones are found in considerable abundance, and about 100 descriptions of marble. Quartz for the manufacture of glass, clays for porcelain, and mineral dyes of all kinds, are also procured.

Every part of the Austrian dominions abounds in mineral waters, and it is said that 1500 distinct springs may be enumerated. Carlsbad, Teplitz, Eger, Bilin, Lieberwerda, Seidlitz, Seidschütz, Carlsbrunn, Rohitsch, Bartsfeldt, Füret, Meladria, Baden, Dorna-Handreni, Krynitz, Gastein, Wildbad, Rabi, and Pejo, are all celebrated for their mineral springs.

Manufactures and Commerce.—Although great progress has been made in manufactures in some parts of Austria, the country is still dependent to a considerable extent on foreign lands. Manufactures are most developed in the German portion of Bohemia, in the districts round Vienna, in Moravia and Austrian Silesia, and in Styria. The Magyar countries are far behind in this respect, and Dalmatia and the Bukowina have scarcely any manufactures at all. The various manufactures of flax, hemp, wool, and cotton causes weaving to employ the largest number of hands; next in number come the metal, stone, paper, glass, and wood workers; then the workers in leather. Iron and steel goods are made in the Alps of Styria. Toys and fancy leather articles have of late years gained conspicuous place at Vienna; the capital may, in fact, be said to comprise within itself one-seventh of all the industrial activity of Austria.

We have already pointed out that, inclosed on almost all sides by mountains, Austria-Hungary has few natural facilities for traffic with the outer world; and this will largely account for the fact that the foreign commerce is comparatively small. The only available sea-board on the Adriatic has to be reached by crossing the high ranges of the Eastern Alps, and then opens only upon an inland branch of an inland sea; the Danube, its great highway, also leads to an inland sea. Two-thirds of the commerce of the country passes overland through Germany; part to Turkey by the Danube; smaller shares towards Italy and Russia. Britain receives large quantities of wheat and flour from Hungary. From the diversity of products of the great divisions, however, the internal traffic is very large; the Danube joins the treeless granary of Hungary with the Alpine lands of the west, which are rich in wood, but deficient in corn.

Railways now extend over every part of the kingdom, and several lines have been carried over the mountains, to bring the central lands into easier communication with the Adriatic.

The total commerce of Austria, comprising imports and exports, was of the value of £187,000,000 in the year 1884—the imports being £65,000,000, the exports £72,000,000. The principal article of import is raw cotton; and those of export, corn and flour. The commercial intercourse of Austria with the United Kingdom is

comparatively small, and appears in the official returns smaller than it really is, owing to the geographical position of the empire, which necessitates the transit of a large quantity of Austrian goods destined for the British market (and *vice versa*) through other countries, in the exports or imports of which they thus figure. In the Board of Trade returns, therefore, only the direct exports and imports to and from the United Kingdom by way of the Austrian sea-board, Trieste, Illyria, Croatia, and Dalmatia, are given. The declared value of the imports thence into Great Britain in 1884 was £1,400,000, and the exports of British produce thereto £800,000. The number of trading vessels of all kinds belonging to Austrian subjects in 1885 was 7200, having a total measurement of 350,000 tons. The "Austrian Lloyd Company" owned in 1885 a fleet of eighty steamers, of 16,000 horse power.

Political Divisions.—The Austrian empire, properly so called, embraces only the Germanic and Polish provinces, with Dalmatia, which are represented in a parliament sitting at Vienna by members elected by the provincial diets. Hungary and its dependencies form a separate kingdom, connected with the imperial crown, but governed by a parliament sitting at Pesth.

Austria proper extends along both banks of the Danube, between the frontiers of Bavaria and Hungary, and consists of two provinces—Lower and Upper—respectively eastern and western, separated in part by the stream of the Enns, one of the smaller affluents of the great river. This district received the German name of *Oesterreich* (whence Austria), signifying "eastern state," as it formed the eastern border of the dominions of Charlemagne. It is the hereditary patrimony of the reigning house, the cradle and nucleus of the empire, to which other possessions have been gradually attached by treaty, marriage, or descent, very few additions having been made by conquest. Upper Austria is chiefly a rugged tract overspread with branches of the Alps. They likewise intrude into the lower division, and form the beautiful chain of the Wiener Wald, which makes a close approach to Vienna, and abruptly descends to the Danube in its vicinity. Romantic valleys intersect this range; fine woods clothe the slopes; villas and chateaux are on every hand; and picturesque ruins of ancient castles occasionally appear, monuments of feudal times, which add to the charms of the landscape. Being at an inconsiderable distance from the heart of the city, the hill-tops are often visited by crowds of the inhabitants to enjoy the fresh air and the noble prospects. The loftiest summit, called the Kahlenberg, is historically famous in its annals. During the last siege of the capital by the Turks, when the people were sore pressed and in despair of relief, rockets were seen one night to rise from it, the appointed signals of the approach of a friendly army, whose banners were beheld the next morning waving to the breeze on its crest. Though of no great elevation (being under 1000 feet) the view embraces a vast stretch of country and a great variety of interesting objects. There is the metropolis, with the graceful spire of its cathedral in the centre rising beautifully against the sky. The towers of Presburg, 40 miles off, may be seen, and in clear weather a glimpse of the more distant Carpathian Mountains may be caught. At the base rolls the Danube, with its steamers, barges, and floats of timber, winding between wooded islets; and for many a mile the eye can follow the course of the monarch of strictly European rivers—now partly concealed from view by dense forests, and anon exposed in broad sheets reflecting the sunbeams. The sites also of several great battles, such as Aspern, Essling, and Wagram, fought among the islands of the stream and on its banks, are clearly traceable.

We annex a statement of the various provinces, with their chief cities and towns; and under most of the names mentioned articles will be found in this work.

Austrian Empire.	Provinces.	Cities and Towns.
Germanic Provinces, . . .	Lower Austria,	Vienna, Wiener-Neustadt, Krems, Baden.
	Upper Austria,	Linz, Steyer, Wels.
	Bohemia,	Prague, Eger, Pilsen, Carlsbad, Toplitz.
	Moravia,	Brünn, Iglau, Olmütz, Presnitz.
	Silesia,	Troppau, Teschen, Bielitz.
	Tyrol and Vorarlberg,	Innsbruck, Hall, Brixen, Botzen, Trent.
	Salzburg,	Salzburg, Hallein, Wildbad-Gastein.
	Styria,	Gratz, Marburg, Eisenorz, Mariauzel.
	Carinthia,	Klagenfurth, Villach, Bleiberg.
	Carniola,	Laybach, Adelsberg, Idria.
	Littoral,	Trieste, Capo d'Istria, Pola.
	Dalmatia,	Zara, Spalatro, Ragusa, Cattaro.
Polish Provinces, . . .	Galicia, with Cracow,	Lemberg, Halicz, Cracow, Wieliczka.
" " " " " "	Bukowina,	Czernowitz.
Hungarian Kingdom, . . .	Hungary proper,	Buda-Pesth, Presburg, Debreczin, Erlau, Tokay.
	Transylvania,	Klausenburg, Kronstadt, Hermonstadt.
	Croatia and Slavonia,	Agram, Fiume, Peterwardein, Karlowitz.
" Occupied " under the treaty of Berlin of 1878,	Bosnia and Herzegovina,	Bosnia-Serai and Travnik.

Population.—The number of inhabitants has fluctuated within recent years, owing to losses sustained in the war with France in 1859, and that with Prussia in 1866. By these wars the empire lost 4,766,910 inhabitants and an area of 16,493 square miles, being a territory larger in extent than the kingdom of the Netherlands. The following is the area of the several provinces, and their population according to the last census, that of 1880:—

Provinces of the Empire.	Area, square miles.	Population.
<i>German Monarchy:—</i>		
Lower Austria,	7,654	2,330,621
Upper Austria,	4,631	759,620
Salzburg,	2,767	163,570
Styria,	8,670	1,213,597
Carinthia,	4,005	348,730
Carniola,	3,856	481,243
Trieste, Illyria, &c.,	3,084	647,934
Tyrol and Vorarlberg,	11,324	912,549
Bohemia,	20,060	5,560,819
Moravia,	8,583	2,153,407
Silesia,	1,987	565,475
Galicia,	30,307	5,958,907
Bukowina,	4,035	571,671
Dalmatia,	4,910	476,101
Total, German Monarchy,	115,903	22,114,244
<i>Kingdom of Hungary:—</i>		
Hungary and Transylvania,	108,258	13,784,460
Croatia and Slavonia,	16,773	1,889,361
Town of Fiume,	8	21,363
Total, Hungary,	125,039	15,695,184
Total, Austria-Hungary,	240,942	37,839,428

The increase of the population in ten years was about 1,750,000.

It was decided by article 23 of the treaty of Berlin of 1878 that the provinces of Bosnia and Herzegovina should be occupied and administered by Austria-Hungary, which decision was carried out in the course of the year. This occupation—which is practically annexation—added a territory of 28,125 English square miles, with 1,212,172 inhabitants to the Austro-Hungarian empire.

The great mass of the Austrian population is composed of four distinct races—distinct as much by descent, fea-

tures, and bodily conformation as in character, language, manners, and usages—*Slavonic, Germanic, Magyar, and Romanic*. The Slavs, the most numerous branch, form fully 45 per cent. of the population. Of this race are the Wends or Vandals, in Illyria and the eastern parts of Styria; the Slavaks and Linzes settled in those districts of the Archduchy which border upon Hungary, and in certain circles in the latter kingdom; the Czechs, or aboriginal Bohemians, of Bohemia and parts of Moravia; the Poles (of two distinct classes, the Mazuraks and Gorals) and Russniaks, or Russians of Galicia and the mountain confines of Hungary and Transylvania; the Morlaks and Montenegrins of Dalmatia; and the Bosnians and Herzegovinians of the "occupied" provinces. The German race is second in numerical importance, but the first in point of intelligence and usefulness and political influence; they form an integral part of the population in Austria proper, Styria, Carinthia, Tyrol, Moravia, and Bohemia, but constitute separate communities in Hungary, in Transylvania, where they are denominated Saxons, in Galicia, on the Kulpa, in Carniola, and in the southern territories around Asiago, where they have lived isolated for centuries under the name of the Setts and Tredici Comuni. Altogether the Germans number about 10,000,000. The third race, the Magyars, migrated from the Kuma, and settled around the banks of the Danube and Theiss in the ninth century; they are esteemed to be of pure Asiatic extraction, akin to the Tartar and Turk, and are a fine and intelligent class of men; they are about 5,000,000 in number, form the majority of the population of Hungary and Transylvania, and are possessed of the finest lands in both these countries. Of the Romanic people the most important are a considerable number of Italians, who inhabit a portion of the south of Tyrol and government of Trieste, Dalmatia, &c.; the Roumanians, on the Danube frontier; and the Valaks, Dako-Valaks, or, as they term themselves, Rumanii—a medley of ancient Thracians, Romans, and Slavonians, whose language is evidently a corrupted dialect akin to the Latin. Among other elements of population Jews are numerous in the northern provinces, Zigeuner or Gipsies in Hungary, and Armenians in Transylvania and Galicia.

Government and Administration.—The various elements of which the Austrian empire is composed are united under a hereditary monarchy, the head of which assumed the title of Emperor of Austria, King of Jerusalem, Hungary, &c., in 1804, and renounced the style of Emperor of Germany in 1806. The succession to the crown is in the male line; and in default of this, passes into the female, as determined by the Pragmatic Sanction, promulgated by the Emperor Charles VI. on the 19th of April, 1713. The

emperor professes the Roman Catholic faith, and cannot, under a family compact, marry any female unless she be of royal blood. The princes and princesses of the imperial family are styled archdukes and archduchesses, and the heir-apparent or presumptive Imperial Crown Prince.

Austria became a constitutional country, in name at least, in 1849. Since 1867 it has been a bipartite state, consisting of a German monarchy and a Magyar kingdom, each possessing its own laws, its own parliament, and its own ministers and government, while the connecting ties between them consist in the person of the hereditary sovereign, in a common army, navy, and diplomacy, and in a controlling body known as the Delegations. The Delegations form a parliament of 120 members, one-half of whom are chosen by and represent the legislature of Austria, and the other half that of Hungary, the Upper House of each returning twenty, and the Lower House forty delegates. On subjects affecting the common affairs the Delegations have a decisive vote, and their resolutions require neither the confirmation nor approbation of the representative assemblies in which they have their source. The ordinary mode of procedure for the Delegations is to sit and vote in two chambers, the sixty deputies of Austria proper forming the one, and the sixty of Hungary the other. But it is provided that if no agreement can be arrived at in this manner, the two bodies must meet together, and, without further debate, give their final vote, which is binding for the whole empire. The jurisdiction of the Delegations is limited to foreign affairs and war. Each of these has its own executive department, the finances of the two being in charge of a third.

The constitution of Austria, the western or Cisleithan monarchy, is founded upon a charter which came into force in December, 1867, modified by certain reforms in 1873. Its main features are a double legislature, consisting first of the provincial diets, representing the various states of the monarchy; and secondly, a central diet, called the Reichsrath, or Council of the Empire.

There are altogether seventeen provincial diets, viz. for Bohemia, Dalmatia, Galicia, Higher Austria, Lower Austria, Salzburg, Styria, Carinthia, Carniola, Bukovina, Moravia, Silesia, Tyrol, Vorarlberg, Gorizia, Istria, and Trieste. The diets of all these provinces are formed in nearly the same manner, only differing in the number of deputies. Each consists of but one assembly, composed (1) of the archbishops and bishops of the Roman Catholic and Oriental Greek Church, and the chancellors of universities; (2) of the representatives of great estates, elected by all landowners paying not less than 100 florins (or £10) taxes; (3) of the representatives of towns, elected by those citizens who possess municipal rights; (4) of the representatives of boards of commerce and trade unions, chosen by the respective members; and (5) of the representatives of rural communes, elected by such inhabitants as pay a small amount of direct taxation. The provincial diets are competent to make laws concerning local administration, particularly those affecting county taxation, the cultivation of the soil, educational, church, and charitable institutions, and public works executed at the public expense.

The Reichsrath, or Council of the Empire, consists of an Upper and a Lower House. The Upper House is formed (1) of the princes of the imperial family who are of age; (2) of a number of nobles (fifty-three in the present Reichsrath) possessing large landed property, on whom the emperor may confer the dignity of state councillors; (3) of the archbishops and bishops who are of princely rank; and (4) of other life members nominated by the emperor, on account of being distinguished in art or science, or who have rendered signal services to the church or state. Until the passing of the Direct Elections Law in 1878, the Lower House was composed of 280 members, elected by the provincial diets from their own number. Now, however, it consists of

853 members, elected by the direct vote of all citizens who are of age and who possess a small property qualification.

The constitution of the Transleithan kingdom, or eastern part of the empire, i.e. Hungary, Croatia, Slavonia, and Transylvania, is based mainly on unwritten laws. The whole legislation and internal administration of the country is left by it in the hands of the native nobility, comprising above half a million individuals, giving to the king little more than the chief command of the army, and the right to protect the kingdom against all enemies. See HUNGARY.

Revenue and Expenditure.—The financial system is exceedingly complicated, there being three distinct budgets, one for the whole empire, one for Austria, and one for Hungary. The first takes cognizance of what is termed the "common affairs of the empire," which embrace ministries of foreign affairs, war, and finance. The estimated expenditure of Austria for the year 1882 was £42,000,000. The revenue for the same period was calculated to produce £40,000,000. The Hungarian budget provided for an income of £24,000,000, and an expenditure somewhat in excess of that sum. The debt of Austria has grown up gradually since the middle of the last century. At the end of the Seven Years' War, in 1763, Austria had a debt of £15,000,000, which grew to £28,300,000 in 1801, and increased from this year in extraordinary proportions. In 1815 it had risen to £82,500,000, to £108,000,000 in 1830, and to £125,000,000 in 1848. The war of 1866 increased the debt by about £30,000,000, but on the other hand freed Austria from the Lombardo-Venetian debt, which was transferred to Italy. From 1789 up to the present time there has seldom been a year in which the revenue came up to the expenditure. The amount of the public debt of the whole empire in 1885 was £380,000,000, the interest on which was £16,000,000. Hungary, by an agreement of 1868, pays 30 per cent. towards the Austrian national debt as then in existence, and it was stipulated that, in future, loans must be contracted separately by either part of the empire. The debt of the Hungarian kingdom, contracted since 1868, amounted in 1882 to £50,400,000.

Army and Navy.—As might be expected after the events of 1859 and 1866, Austria has of late years devoted great attention and large sums of money to perfecting its military resources, with the result that, in spite of former reverses of fortune, it must now be reckoned as one of the most formidable Continental powers. On a peace footing the army numbers only about 300,000 men, but on mobilization Austria could put no less than 900,000 men into the field; or, if the efficient landwehr be included, 1,200,000 men, with from 2000 to 2200 guns. The fighting material would not be so homogeneous as that of Germany or France, being drawn from so many different nationalities; but in the presence of any danger to the country the army could be thoroughly relied upon, while the artillery is of the best in Europe. The standing army is formed, after the model of Prussia, by universal liability to serve in the army. The term of service is ten years, three of which the soldier must spend in active service, after which he is enrolled for the remaining seven years in the army of reserve, with further liability to serve two years in the landwehr. There are twenty-five fortresses of the first and second rank.

The Austrian navy consisted in 1883 of ten ironclads and thirty-seven other steamers, chiefly of small dimensions, and ten sailing ships. The navy is recruited by conscription from the seafaring population, the term of service being eight years, a portion of which time is passed in the reserve. There are two harbours of war, Pola and Trieste, the first being the chief naval port, and the second the store-house and arsenal.

Religion and Education.—The state religion of Austria is the Roman Catholic, and is professed by about two-thirds of the people; but there is toleration for all forms of belief.

A large proportion on the eastern borders next Russia adhere to the Greek Church; Protestants are most numerous in Hungary and Transylvania, but even there form only a tenth part of the people. General education, excepting in German Austria, where education is compulsory, is in a very backward state. There are seven universities in Austria-Hungary—at Vienna, Prague, Pesth, Gratz, Innsbruck, Cfacow, and Lemberg. Next in rank are the theological seminaries, over 100 in number.

History.—In the times immediately succeeding the Christian era the Romans advanced from the Alps, and invaded that part now called the "Province below the Enns," in which Vienna itself is situated. The land was occupied as separate hunting grounds, the resort of semibarbarous tribes, among whom the Pannonii, Boii, and Norici are most frequently mentioned in the Roman annals. Over such a race triumph was easy; a state of dependence quickly succeeded to a condition of savage freedom; and the establishment of military colonies on the Danube, as part of the Roman line of defence against the barbarous hordes of the north, was succeeded by the incorporation of this tract of country with the province of Pannonia. Noricum thenceforward supplied the Roman legions with fierce and hardy soldiers. In the fourth century, when the north poured down its hordes upon the south, the middle regions of the Danube fell a victim to the spoilers, who successively traversed them in quest of more alluring prey. From thence to the time of Charlemagne they were subjected to a succession of ruthless attacks, but that conqueror reduced it under his dominion. It was a dependency of Bavaria from 914 to 1269, when Ottakar, king of Bohemia, seized it; but in his struggle to maintain his conquest against Rudolph of Hapsburg, emperor of Germany, the latter expelled him from the Austrian territories in 1276, and seven years afterwards invested his son Albert with the sovereignty, as an appendage to the Hapsburg possessions. His successors in the course of time extended their dominion over several other states, which they acquired either by marriage, purchase, or inheritance. Among these we may mention the margraviate of Burgau in Styria, acquired in 1283; Carinthia, in 1331; Tyrol, in 1363; Trieste, in 1380; and the landgraviate of Breisgau, in Swabia, in 1367. From the middle of the fifteenth century, or more accurately speaking, from the year 1437, when Albert II. was raised to the dignity of King of the Romans and Emperor of Germany, this high office was uninterruptedly enjoyed by the Hapsburg line of Austrian sovereigns. At one time the Austrian emperor's dominions, under the house of Hapsburg, included Alsace and the Netherlands; and at another time, under Charles V., Spain and the Indies; but both of these possessions afterwards fell off. Ferdinand I., by marriage with the daughter of Lewis II., king of Hungary, in 1526, became possessed of her extensive inheritance, which was composed of Hungary, Bohemia, Moravia, Silesia, and Lusatia. The ancient possessions of the house of Hapsburg in Switzerland had been gradually wrested from it, the signal being given by the confederation formed by Uri, Schwytz, and Unterwalden in November, 1307; and the Thirty Years' War, in the middle of the seventeenth century, stripped it of Alsace and Lusatia. Austria, however, received ample compensation under the treaty of Utrecht in 1713, which united the Netherlands and certain states in Italy to its dominions. Under Maria Theresa the Austrian empire lost Silesia, and then Parma; but gained Galicia and Lodomeria, and the Bukowina. Francis II., whose accession took place in 1792, lost the Netherlands and Lombardy in 1797, in exchange for which the treaty of Campo Formio gave him the Venetian territories. The subsequent treaty of Lunéville, in 1801, did not much affect his dominions, but the peace of Presburg, in 1805, was purchased by the sacrifice of his possessions in Italy, Swabia, and Tyrol, for which

the acquisition of Salzburg was but a poor indemnity; and the treaty of Vienna, four years afterwards, wrested from him, in addition, not only a considerable portion of Galicia, which fell to Russia, but Carniola, Istria, Salzburg, the lands called the "Innviertel," Venice, and other southern provinces. Full restitution was, however, made to him by the provisions of the treaties of Paris in 1814, and of Vienna in the following year. Breisgau, we should add, became the property of Baden in 1810. Francis declared himself hereditary Emperor of Austria in 1804, and laid down the dignity of Emperer of Germany and King of the Romans two years afterwards. He died in 1834, and was succeeded by his eldest son, Ferdinand I. By virtue of his German possessions the emperor was a member of the German confederation, entitled to four out of the seventy votes in its full diets. As such he had to keep one in every thousand of the population of his German dominions in a perfect state of equipment and marching order, and supply in case of public emergency a first contingent of 94,882 men.

The revolution in France which overthrew the rule of Louis Philippe (on the 24th February, 1848) affected most of the European states. It led Austria into great difficulties. The nationalities, which had long suffered from the despotic imperial power, rose openly against it. In Vienna itself the revolutionary spirit triumphed for a season over the government, while in Italy and Hungary it carried all before it. In the former country, Charles Albert of Sardinia assumed the leadership; in the latter, Louis Kossuth directed the revolutionary movement. On the part of Austria, Radetsky took the field against Charles Albert, and after several engagements dispersed the Italian troops at the great battle of Novara. This led to the abdication of Charles Albert. First Windischgrätz, and then Haynau and Jellachich, ban of Croatia, led the Austrians against the insurgents in Hungary, and ultimately, with the help of Russia, the imperial power triumphed. Ferdinand I., feeling himself unequal to the situation, abdicated in favour of the Archduke Francis Charles, and the son of the latter, Francis Joseph, was declared emperor, 2nd December, 1848.

For a time the power of Austria in Italy seemed supreme. Parma, Tuscany, Modena, the Roman states, and the kingdom of the two Sicilies entered into secret obligations which acknowledged her predominance. On discovering the Austrian intrigues, Piedmont felt that its constitutional government and national independence were menaced, and rapidly began to arm. Austria professed to be alarmed by her hostile preparations, and threatened war unless they were discontinued. In this emergency the Emperor Napoleon III. stood forward as the champion of Italian liberty, and when the Austrian troops under Marshal Giulay crossed the Ticino (29th April, 1859) he suddenly declared war, landed a large and well-equipped army at Genoa, and took the field in person. The Emperor of Austria, aware of the gravity of the situation, likewise repaired to the scene of action, and Victor Emmanuel, the king of Sardinia, took the command of the Piedmontese forces. A brief but sanguinary campaign ensued.

The principal engagements were Montebello, 20th May, 1859; Palestro, 31st May; Magenta, 3rd June; Solferino, 24th July. In each the Austrians were defeated, and at Solferino the repulse was so complete that Francis Joseph gladly opened negotiations for peace with the Emperor Napoleon, and purchased the safety of his empire by the cession of Lombardy to Italy, still retaining Venice.

After these events the Austrian government showed an anxious desire to consolidate the empire by satisfying the just aspirations of the various races which compose it. The emperor made numerous concessions to his Hungarian subjects, announced his intention of being crowned King of Hungary with all the old formalities, and imperial diplomas and patents were prepared as the basis for a liberal constitutional government.

But Austria was not permitted to follow out her pacific dreams. In 1864 Prussia began the development of a long-matured project for ousting her from the leadership of Germany. She engaged the emperor to join in her unprovoked hostilities with Denmark for the separation from that kingdom of the continental provinces of Schleswig-Holstein. Against two such powerful enemies Denmark could make no stand, when deserted by all the chief European powers. By the treaty of Vienna, 20th October, she resigned the duchies to the two allies, who, however, soon quarrelled about the disposition of the spoil. The breach between the two courts widened daily. Austria could not but see that Prussia, while openly breathing peace and friendship, was arming to the teeth, and perfecting her military organization. She felt that her position as a paramount power in Germany was menaced. In vain she sought for allies. Russia stood aloof; England had no sympathy for a state that clutched Venetia in a grasp of tyranny; Italy had secretly concluded an offensive and defensive alliance with Prussia; and France, cajoled and bribed by the Prussian minister Count von Bismarck, would make no sign. It is unnecessary to unravel the web of intrigue by which the ambition of a king and his statesmen, and the overmastering desire for a strong and united Germany in the breasts of his people, were eventually gratified. Austria made what preparation she could to meet the storm, and having exhausted every diplomatic artifice, reluctantly drew the sword. She soon found herself not only unable to cope with her formidable foe, but attacked on both sides by Prussia and Italy, was beaten with a suddenness and completeness which astonished all Europe. The Prussian troops, armed with the needle gun, defeated the Austrians on every field, and the crushing disasters of Munchengrütz (24th June, 1866) and Sadowa (3rd July), which exposed Vienna itself to the assault of the victors, compelled the emperor to sue for peace. A treaty was concluded at Prague between the three combatants, which gave Venetia to Italy; Hanover, Hesse, and other provinces to Prussia; dissolved the German confederation, and entirely swept away the emperor's pretensions to its leadership.

After the war—following out the maxim of a great German philosopher, that “what a state loses in outward importance must be replaced by inward greatness and development”—Austria applied herself vigorously to the task of making a consolidated nation out of the various conflicting nationalities over which she presides. Great and liberal measures of conciliation were passed, and a constitution was granted to Hungary, which at once secured its contentment and loyalty to the state. Internal reforms of every kind were inaugurated, new charters and privileges were granted to the people, and nearly every branch of the administration was reorganized. A more liberal commercial policy was adopted, and a general impulse given to industry and enterprise throughout the empire. Further, in spite of the most determined opposition of the Roman Catholic hierarchy, bills were passed in 1868 recognizing the validity and legality of civil marriages, and depriving the clergy of their almost absolute power with regard to education. A violent hostility to these measures being still maintained by the priesthood, the campaign between the church and state closed in 1870 by the complete abrogation of the Concordat, and the sweeping away of all privileges held by the Roman Catholic Church beyond those enjoyed by other religious communities. Lastly, by the passing of the Direct Elections Law in 1878. Austria, which until then had been but a system of independent states, became possessed of a truly imperial parliament, representing national instead of merely provincial interests. The government have several times during the present century, once so lately as 1868, tampered with public credit, in order to relieve regularly recurring emba-

rasments. Of the undeveloped wealth of the country, and of the industry and energy of the people, there can be no question; and if only peace could be insured, and a fair run of prosperity enjoyed, Austria might yet see the end of its sorely trying period of deficits. In the Russo-Turkish war of 1877 Austria viewed with much suspicion operations which might have resulted in the formation of an important Slavonic power on the southern border of Hungary. She, however, remained neutral, and her passive attitude was subsequently rewarded by the virtual cession of Bosnia and the Herzegovina, where Austria now holds a very commanding position in relation to the states which were emancipated from Turkish rule by the war.

AUTHENTIC, in music, applies to the construction of scales, and to the peculiarities of melody and harmony resulting therefrom. When a scale begins on the tonic and passes upwards through the notes of the key it is authentic, and tunes written in the compass of such a scale (extended to an octave in length usually) would be called authentic. The contrast to authentic is *plagal*, where the scale begins from the dominant, and the tunes have notes in something like equal proportion on each side of the tonic. “God save the Queen” may be regarded as authentic, since it has but the leading note below the tonic; whereas “Rule Britannia” is plagal, descending largely to the dominant below. “Ein’ Feste Burg” is authentic, “The Old Hundredth” is plagal. It is generally considered by musicians that authentic melodies carry a certain strength and majesty with them, and that plagal melodies excel in sweetness and delicacy. In counterpoint the lower division of the key, that, namely, from tonic to dominant, is called authentic, and the upper division, from the dominant to the tonic, is called plagal; and the one half, though of five notes, is answered by the other of four notes, the needful alterations in melody being controlled by many rules developed from the practice of the great composers. Another extension of the same idea causes the word to be used to describe the “full close” or “authentic cadence”—that in which the dominant harmony resolves on to the tonic common chord—forming the most perfect conclusion of a musical idea; in fact so completely closing the musical sentence that it is never used by good writers except at the end of a composition, or to mark one of its principal divisions. The contrast to this is the “plagal cadence”—a favourite close in ecclesiastical music, not elsewhere so much used because of its want of the finished completeness of the authentic cadence. Here the chord of the subdominant resolves on to the chord of the tonic. The contrary to both authentic and plagal cadences is the half close or imperfect cadence, where the harmony resolves on to the dominant chord—of course leaving the mind in suspense, and the piece still uncompleted.



Authentic Cadence. Plagal Cadence. Imperfect Cadence.

These terms grow out of the creation of ecclesiastical music by St. AMBROSE (374 A.D.), who made four modes, according to the number of the evangelists, from the then popular Hypodorian scale of the Greeks. [See MODES ECCLESIASTICAL, and GREEK MUSICAL SYSTEM.] Ambrose took the notes D, E, F, G as his finals; and his four modes can be exactly reproduced on the pianoforte by using only the white keys, and playing octaves from the respective finals. It will be seen that each mode differs in character, and consequently the “tones” or chants written in each differed likewise. By St. Gregory’s time (A.D. 590) the musical work of St. Ambrose was in confusion, and melodies had been written extending below the finals in each mode. St. Gregory hit upon the happy expedient

of adding to each authentic mode (that is, to each *genuine* or *original* mode, for that is the signification of authentic) a plagal mode, or mode which lay *athwart* the first, that being the meaning of the latter word. Thus Ambrose began from D, and Gregory added a plagal from the A below; the last, as its name signified, lay athwart the final D, half below it, half above it, and gave a much more workable and useful arrangement of the notes of the key. Therefore the mediæval musicians worked in eight modes, four authentic and four plagal; but it must be remembered that all of these eight were, as we should now consider, in the same key, and that what was really done therefore was to use as final sometimes one note of the key, sometimes another, according to the mode, whereas in the present day the key-note alone is regarded as the final. No other note is tolerable to modern ears as a final, for no other can give an absolute close to a musical idea, and this has grown to be a necessity for us.

AUTHENTIC (Gr. *authentēs*, one who does things with his own hand), a term applied to any writing or document, the contents of which are accurate and trustworthy. In biblical criticism it is used to signify the truth and authority of the statements made or doctrines taught in any of the various books, as opposed to the interpolations made by copyists, &c. In questions of authorship the term *genuine* is used to signify that the book is the work of the person whose name it bears. This distinction between the terms is not observed in general literature, where the word authentic may be regarded as synonymous with genuine.

AUTOCRACY (Gr. *autos*, self; *krateōs*, power), a term used to signify that form of government in which the sovereign possesses absolute power. Most eastern governments are of this kind; but in Europe (if we exclude Turkey, as being truly Asiatic) the Emperor of Russia alone is an autocrat, and is without constitutional control over his authority. The term is used by Kant in his system of philosophy in another sense; with him it denotes the mastery of the reason over the animal propensities of man's nature. The Autocrat of all the Russias holds power *by himself*; the Kantian autocrat holds power *over himself*—that is, the higher self over the lower self.

AUTO DA FE (Portuguese, "act of faith;") the Spanish term is *auto de fe* was the name given to the public solemnity that formerly took place in Spain, Portugal, and the Spanish settlements in America at the execution of those persons who were condemned by the Inquisition. The day selected was generally a Sunday between Whitsunday and Advent, and every effort was made by the priests to make the ceremony as imposing as possible. The proceedings were opened by the tolling of the bell of the principal church early in the morning, and a solemn procession was formed, which passed through the principal streets of the town to the church. The Dominicans led the way, carrying the flag of the Inquisition; then followed those who had been found innocent, or who had only been adjudged worthy of penance. Next followed those condemned to death, clad in a hideous costume; and with them the remains of those who had died in prison were carried, in black coffins painted, as were the dresses of the condemned, with flames, devils, &c. The priests and monks brought up the rear. After service in the church the sentences were read, and each prisoner received a blow on the breast from an officer of the Inquisition, which signified that he was handed over to the secular arm for punishment. Later in the day they were brought out for execution. Those who recanted were privileged to be strangled, but those who remained steadfast were burned alive, the bodies of those strangled and the remains of the dead prisoners being also committed to the flames. These horrible exhibitions were frequently witnessed by the king and court, while the populace held high holiday on the

occasion. The first *auto da fe* was held at Seville in 1481 under the direction of Torquemada, and as late as 1826 a schoolmaster was executed for deism at Valencia under the same forms. As many as thirty-one persons were burned at an *auto da fe* held at Valladolid in 1559.

AUTOGRAPH (from the Greek *autographos*, written with one's own hand), an original manuscript; the handwriting of any person.

Collections of autographs, as the handwritings of individual persons, had their origin about the middle of the sixteenth century in Germany, where the gentry carried about with them *white paper* books, to obtain and preserve in them the signatures of persons of eminence or new acquaintance, whence such a book received most generally the name of "Album," though it was sometimes called "Hortus" or "Thesaurus Amicorum."

The fashion spread to France and England, and at the present time is so eagerly pursued that the autographs of eminent persons are regular articles of commerce. Their value depends upon a variety of circumstances, such as the position and fame of the writer, the scarcity of such autographs, the nature of the MSS., letter, or document, &c. There is also a widespread opinion that the handwriting of any individual will afford some slight indication of his character.

Valuable collections of MSS., letters, documents, and signatures are to be found in the British Museum, Record Office, &c., and a complete collection of the autographs of the sovereigns of England from the Conquest was published in fac-simile by John Gough Nichols in his valuable work on the subject (London, 1829, folio). Valuable works have also been published in France and Germany on this subject. Prefixed to this volume are several Plates of Autographs of celebrated persons, from the fifteenth to the nineteenth centuries.

AUTOMATIC ACTION is the term applied in physiology to those movements which arise from independent nerve-action unprompted by any stimulus. Of such the most wonderful is the action of the heart, which continues to beat for some time after being removed from the chest; and which, if it is the heart of a cold-blooded animal, will not cease to beat for hours, and in some cases even for days. If the heart is excited by the presence of blood its action is very much strengthened, as in the living body; but it is not dependent on that stimulus, as the above experiment shows. If it were so dependent the movement would be denominated a REFLEX ACTION, one of a series of involuntary movements, like winking, sneezing, &c., dependent on external stimuli, which series is fully described in the article bearing its name.

Another remarkable automatic centre is the *respiratory centre*, a certain very small tract of the medulla oblongata (that inch and a quarter of nerve matter which connects the spinal cord with the brain, and whence nearly all the great cerebral nerves arise), which small tract of so small a surface Flourens once seriously called "le nœud vital" (the vital knot). For if this small portion be excised from the medulla, breathing at once ceases; and yet it is sufficient to control all those numerous separate movements of many distinct muscles which make up the complex act of inspiration, and the not far less complex act of expiration. Now, just as in the case of the heart, we can increase respiration by action of the will, or through reflex action (as by a dash of cold water, &c.), and similarly we can check respiration, yet, in the face of repeated experiments, we are compelled to pronounce the action automatic. We breathe independently of any stimulus, by the sheer self-originated (that is, automatic) activity of the above-mentioned tiny respiratory centre of the small inch-and-a-quarter-long medulla. This, indeed, is the size of the whole medulla in man, but its size in small animals is incomparably minute, yet the same marvellously complex results ensue.

Another wonderful set of automatic movements is exhibited in the peristaltic motion of the alimentary canal, the peculiar circular contraction of successive rings of the canal which pushes the food through the body, the contraction travelling forwards like a wave and producing the well-known writhing movement of the intestines. Such a wave may be traced by the observer in suitably prepared subjects, beginning from the pyloric end of the stomach, for a long way down the intestine. Now, certainly this peristaltic action is greatly stimulated and increased by the presence of food in the canal; but it is, no more absolutely dependent upon it than the heart upon the presence of blood for its working. When food is absent the movements may be set agoing, and when present they may be stopped, and that without alteration of the food.

The highest automatism of all is one long considered to be peculiar to Man—*volition*: the function, namely, of certain parts of the brain to originate thought, apart from the stimulus of sensation. Happily man is now linked by science firmly to the rest of creation in this as in all other characters, his pre-eminence thereby being only made the more distinct and wonderful. Man is without a peer in creation, possessing the most automatic—that is, the most originaive, self-dependent—brain of all beings; and this it is which sets so weak, so slow, so defenceless a creature, and one so dull of sense by nature, as master beyond dispute over the strong, the swift, the fierce, and the sensitive brutes which he holds to his use or his sport.

AUTOMATON (Greek, self-moved) is a name generally applied to all machines which are so constructed as to imitate any actions of men or animals. The name *androids* has sometimes been given to those which simulated the movements of the human figure. The construction of such machines has been attempted from very early periods, and as far back as the fourth century B.C. Archytas of Tarentum is said to have made a wooden pigeon that could fly. During the middle ages several instances of the successful construction of automata are recorded. In the thirteenth century Roger Bacon is said to have made a head of brass that spoke, and the construction of a speaking head is also attributed to Albertus Magnus, who in addition is said to have made a mechanical porter to open his door, which was broken by Aquinas. In the fifteenth century, also, Regiomontanus is said to have made an iron fly with motions resembling life, and a mechanical eagle which rose up in the air as the Emperor Maximilian entered the gates of Nuremberg. These stories, it need hardly be said, are quite unverifiable at this distance of time, especially as no record has been kept of the principles of construction on which the machines were made. In the eighteenth century, however, numerous ingenious automata were made, of which the construction is known, and of which trustworthy accounts are preserved. The most famous of these were the figures constructed by a Frenchman, M. Vaucanson, consisting of a flute-player which produced the notes on its instrument with its fingers, a flageolet-player which also beat a tambourine, and a mechanical duck which swam, dived, quacked, dressed its wings, ate, drank, and even, by means of a chemical solution in the stomach, digested its food.

Apparently among the most successful of such machines was that known as the automaton chess-player, exhibited by Kempelen, which excited intense wonder and interest for a considerable period. Contrived with wonderful skill and ingenuity, the secret of its movements baffled all attempts at discovery. The trick was revealed by the inventor, who had managed to conceal in the figure a crippled Russian officer, a very skilful chess-player. All the whirring wheels and mechanism seen here and there in the interior were mere shams, and the figure was in no sense automatic. Since then numerous playing, writing, drawing, and speaking figures have been exhibited, and

machines for setting up type are now used in the *Times* newspaper office.

Mr. Maskelyne of London may be regarded as the "automatist" of the close of this century. Not content with repeating the trick of the automaton chess-player, though so cleverly that the exact position of the concealed person was never discovered, he produced a far more ingenious contrivance for playing whist, the small size of the figure, insulated on a perfectly transparent glass cylinder, quite precluding any device of concealed players, &c. This was, of course, a trick, but the cleverest scientific men in London tried in vain to solve the mystery, even when they surrounded the figure during play. Probably the cornet-player by the same constructor was to a certain extent truly automatic.

AUTONOMY (Gr. *autonomia*, self-legislation) is the system by which the members of a state, city, or corporation make their own laws and manage their own government. In the history of ancient Greece it is used to designate that political condition when every city or town community claimed for itself independent sovereignty, making its own laws and recognizing no external authority as superior to itself. By Kant the term was used to denote the sovereignty of the pure reason, whereby a man lives according to his own law.

AUTOTYPE. Reproductions of pictorial art by means of photography, although absolutely faithful, are found liable to gradual and spontaneous change, the result of slow chemical decomposition of the metallic oxides by which their lines and shadows are composed. Means have, however, been found for reproducing pictures photographically, but yet in printer's ink or other permanent pigment, so that the perfect fidelity of the camera is combined with absolute durability. Such reproductions have been called "autotypes," to signify that they are due to the action of the original alone, without any intervention on the part of the artist or draughtsman.

The process depends upon the fact that certain substances, of which gelatine may be taken as the type, when combined with an alkaline bichromate, are rendered insoluble in water by the action of light. It follows, if a film of gelatine so prepared is placed under a negative on glass and exposed to the daylight, that this penetrates through the lights of the negative and renders the gelatine beneath insoluble, but does not penetrate through the dark parts, so that the gelatine beneath them is left in its natural state. When the resulting picture is immersed in water the unaltered gelatine absorbs a portion, swells, and becomes somewhat elevated, while the insoluble gelatine undergoes no change. The parts corresponding to the darks of the negative are thus thrown somewhat into relief; and further, as they retain water, they will not receive printer's ink, although the insoluble gelatine that has been under the lights of the negative will receive and impart it freely. In this way a plate is obtained in which impressions may be taken with ink and the printing press—the power to do so not being due at all to the reliefs and depressions of the gelatine plate, but entirely, as in lithographic printing, to the different receptivity of its different parts for ink; and inasmuch as the depressions are the parts that receive ink, they are absolutely objectionable, and tend to interfere with the perfection of the printing. On this account, and in order to diminish the relief of the soluble portions, the thickness of the gelatine plate has been continually reduced, until it now amounts to no more than a film adherent to a plate of glass or other rigid support. The inconvenience of the natural softness of the gelatine plates is avoided by the admixture of mastic and other gums, which, while yielding a perfect surface, and one capable of reproducing in every particular the exact texture of the original, sufficiently hardens the film to enable it to endure the wear of a printing press.

Autotype transfer reproductions can now be made of any magnitude within the limits of a camera, and can be taken from any picture that light will either penetrate or copy—that is to say, from any existing negative, from any photograph, any engraving, any painting in monochrome, and from some paintings in colour. Save for enlargement or diminution, they are copies of absolute fidelity, such that they could not always be distinguished from their originals. The colour can be determined at pleasure among the wide range of practically indestructible pigments, and the pictures will certainly be as permanent as prints or engravings, which undergo no appreciable change by the action of time.

For purposes of book illustration the autotype printing process offers not only the advantage of reproducing with exquisite accuracy every touch of the artist in every print, but that of considerable economy, especially in the preparation of small editions. The preparation of the gelatine plate is inexpensive; but very careful and skilful working being required, the process of printing is comparatively slow.

AUTUMN, the season of fruiting; the joyous fulfilment of the year. Winter's sleep and spring's awakening lead on the fruitful earth to the full life of summer and the harvest of autumn. He whom Milton calls "our sage and serious poet Spenser, whom I dare be known to think a better teacher than Scotus or Aquinas," sings in his unequalled imagery thus of autumn:—

"Then came the autumn, all in yellow clad,
As though he joyed in his plentiful store,
Laden with fruits that made him laugh, full glad
That he had banisht hunger, which to-fore
Had by the belly oft him pinched sore:
Upon his head a wreath, that was enrold
With eares of corne of every sort, he bore;
And in his hand a sickle he did holde,
To reape the ripened fruits the which the Earth had yold."

(Perhaps it is necessary to say that *to-fore*—before, *enrold*—twined, *gold*—yielded.) By this it is clear that a good slice of August properly belongs to autumn, and so in popular speech it does. Reaping makes in every one's mind an autumn scene, but in most parts of England it is an August, not a September work. Yet in the calendar it is customary to leave out August (the latter half of it), and add at the other end the wintry close of November; and the autumn of the almanack consists of September, October, and November. Not content with these old Roman names in their Quaker simplicity of Seventh-month, Eighth-month, Ninth-month (the Roman year beginning with March), the French Revolutionaries of that wondrous time of 1793, in recasting their calendar, renamed the months. Rome, aided by Monge, Lagrange, and others, had furnished mathematics; Fabre d'Églantine coined a new poetic nomenclature. He grouped for his autumn the last week in September, all October, all November, and the first three weeks of December—truly an advanced autumn! The mathematicians insisted that it should begin at the Equinox; that is, 21st September. For twelve years did the world of France call its months anew, arranged by seasons in rhyming fashion, thus—Winter, *Nivôse*, *Pluviose*, *Ventose*; Spring, *Germinal*, *Floreal*, *Prairial*; Summer, *Messidor*, *Thermidor*, *Fructidor*; Autumn, *Vendémiaire*, *Brumaire*, *Frimaire*. Translations of these have been attempted, from Carlyle's (autumn) "Vintage-arious, Fog-arious, Frost-arious," to Punch's "Poppy, Hoppy, Sloppy"—the latter alluding to the slaughter of partridges, the brewing of ale, and the discomfort of November sleet. But the Republican *Fructidor* (Fruit-bearer), beginning about the 17th of August—subject to variations for leap-year and the like—would serve well as the first month of a true autumn. It is undoubted that the 13th Vendémiaire, 1795, clings to the memory far better than any 3rd October (its relative date) would do; for was it not in the month of grapes that the "whiff of grapeshot" was fired and the bloody

harvest reaped that set up the Directory by help of him so soon to become its master, the young artillery-officer Bonaparte? And the 18th Brumaire, the Mist-month, does it not seem a fitting title for that day of deceit which raised the ambition of that same artillery-officer to its pinnacle?

The very word autumn is delightful, for it comes from the Latin *augere*, to increase; and the waving golden corn, the purple grapes, the rich brown-yellow hop clusters, the yellow-tinted hazel copses, the rosy, streaked, or russet-clad apples, bending the crowded boughs under their weight, give us sights never failing to charm the eye and fill the mind with imagery. All poets and artists love the autumn, with its wealth of colour and its bountiful harvest.

AUTUN, a city of France, in the department of the Saône-et-Loire, on the Arroux, a tributary of the Loire, is situated 179 miles S.E. of Paris. The population in 1882 was 14,000. Autun is one of the most ancient cities in France, having been founded by Augustus and called *Augustodunum*, of which the modern name Autun is a corruption. It supplanted *Bibracte*, the old capital of the Edui, which stood on Mount Beaunray, about 10 miles to the S.W. It is generally supposed to have been the Gaulish town where Cæsar wintered after the battle of Alisia. In the third century Autun suffered much from the ravages of war. Upon the downfall of the Roman power, the town was burned by Attila, king of the Huns, and afterwards it came successively into the hands of the Burgundians and the Franks. In 731 the Saracens burned it, and in 888 it was nearly destroyed by the Normans. It was burned by the English in 1379. There still exist many ruins of Roman temples, gates, triumphal arches, and other antiquities. The Roman walls are very massive and curious; large and perfect fragments still exist.

The modern town is built on the slope of a hill, and occupies only part of the site of the ancient city. It is divided into three parts, the highest of which, called Le Château, occupies the site of the ancient capitol. The Gothic cathedral, dedicated to St. Lazare, is much admired for the boldness of its architecture, its lofty spire, and its carving and sculptured decorations. It is of the eleventh and twelfth centuries, but was restored in 1865. In front of it is a square adorned with a handsome fountain. The second quarter, called La Ville, contains the principal square. The third quarter, the Marchau, has low ill-built houses and narrow streets. There are two bridges over the Arroux. Autun has a library, a collection of pictures, statues, and medals; baths, theatre, and tribunals of commerce and of first instance. The trade of the town consists in horses, cattle, wood, and hemp. Serges, cotton velvet, cloth, hosiery, and leather are among its manufactures. To the east of the town are several mills. A fabric called *tapisserie de marchau*, fitted for coverlets of beds, horse-cloths, and other purposes, is made. The district around the city contains green porphyry and gray granite. There are also iron and lead mines near the town.

The bishops of Autun held high rank in the church. They had jurisdiction over part of the city. Talleyrand was bishop of this see when the Revolution broke out. General Changarnier was a native of the town.

AUVERGNE, a former province of Central France, which now forms the departments of CANTAL and PUY-DE-DÔME, and the arrondissement of Brioude. [See LOIRE, HAUTE.] It is almost entirely covered with high mountains, which contain many dome-shaped summits, extinct craters, and other evidences of former volcanic action. The greater part of the province is not adapted to cultivation. Chestnuts are very abundant, and pasturage is excellent; cattle are very numerous, and a great deal of cheese is made. The province was formerly divided into Haute-Auvergne, Basse-Auvergne, and the Pays-de-Com-

brailles, the chief towns of which respectively were St. Flour, Clermont, and Evaux. In Basse-Auvergne lies the fertile district in the province. It is called the Limagne, and extends along both banks of the Allier; it presents a succession of hill and dale, towns, villages, and hamlets, gardens, orchards, vineyards, and cultivated fields. The numerous streams by which the district is intersected are applied by the industrious inhabitants to increase by irrigation the natural fertility of the soil. Special attention is devoted to the rearing of cattle, horses, and mules.

Auvergne contains several minerals, and hot springs, coal, iron, and antimony mines, and numerous industrial establishments, the most important of which are paper manufactories. The chief rivers of Auvergne are the Allier, the Dordogne, the Sioule, and the Allagnon. The country derived its name from the ancient *Averni* ("highlanders"), who long defended their mountain fastnesses against Cæsar. The Auvergnats furnish a considerable number of steady labourers for Paris and other towns, many of whom return to their native places after they have acquired a competency.

AUVERGNE, GEOLOGY OF. A considerable portion of Central France is formed of gneiss, mica-slate, and other of the inferior stratified rocks, associated with granite. The beds of gneiss, mica-slate, and others of the same class, are sometimes highly inclined and contorted, as may be observed near Menat, showing that they have been acted on by some powerful force. As a whole, these rocks constitute a kind of elevated plain, having a mean height, according to Ramond, of about 8200 English feet, and rising, at Pierre-sur-Haute, to an elevation of 5410 feet above the level of the sea.

Above these rocks we find others that must have been formed at periods separated from each other by considerable intervals of time, since many rocks, necessary to complete the series of European deposits, are wanting between them. Finally, numerous volcanoes, now extinct, poured forth an abundance of igneous products, which, though comparatively recent, have preserved the remains of animals that have disappeared from the surface of the earth. The rocks which in the order of relative antiquity succeed the inferior stratified and granitic rocks above noticed are referred, from the vegetable remains detected in them, and from their general mineralogical character, to the same age as the coal measures of Great Britain.

A long interval of time appears to have elapsed, judging at least from the rocks now found in Auvergne, before any other deposits were formed in this part of the European area. The most notable are the deposits of Limagne, 1600 feet thick, formed in a large lake, and contemporaneous with the Oligocene (Lower Miocene) deposits of Switzerland. The remains of nearly 100 species of mammals have been discovered here; also crocodiles, snakes, and birds. At Perrier are found Pliocene deposits, containing remains of antelopes, deer, hyænas, hipparion, machairodus, elephants, and a hippopotamus, probably identical with the one now living in Africa.

Subsequently to the production of the greater proportion of the lacustrine rocks, the surface of the country was broken up, and volcanic products ejected in great abundance. The great proportion of the more modern volcanoes of Auvergne occur in the vicinity of, or at moderate distances from, the town of Clermont. Though they are for the most part distinguished by craters in different states of preservation, by lava currents, and by accumulations of cinders, ashes, and ejected portions of pre-existing rocks, there are some remarkable for the absence of craters and lava currents. These craterless cones may be due either to the lava not having been so liquid as usual, and being unaccompanied by scoræ, or they may represent the "roofs" of original craters that have been entirely removed by denudation. Many cones are composed of dust and stones in irregular

layers, dipping down the slopes of the cones and into the hollows of the craters. These layers have been solidified to form *tuff*. In a number of the Puy the lava streams have broken through the side of the crater. Many of the lava currents choked up the valleys, and have had channels cut in them at a later period by the action of running water. Lake Aïdat is formed by a stream of lava flowing across the original river and damming it up. (See Serpée's "Geology and Extinct Volcanoes of Central France.")

AUXERRE, capital of the department of Yonne, in France, is situated on the left bank of the Yonne, which here begins to be navigable, at a distance of 104 miles S.E. from Paris by the road through Melun, and 90 miles by railway. The population in 1882 was 16,500. The city stands on the slope of a hill, in a country fruitful in wine; the air is very pure. It is a fine old place, with many well-built houses and some wide streets. There are two squares. The Gothic cathedral, dedicated to St. Stephen, stands high, and is considered one of the finest in France. The Church of St. Germain is celebrated for its crypts and relics. The other remarkable buildings are the churches of St. Eusebius and St. Peter, the buildings of the ancient Abbey of St. Germain, now attached to the Hôtel Dieu, and the bishop's palace, now the residence of the prefect. Woollen cloths, serges, druggets, stockings, strings for musical instruments, bricks, and pottery are made in Auxerre. The chief trade of the town is in wine, which is sent by water to Paris and into Normandy. Wood and charcoal are also considerable articles of trade at Auxerre. There are a library which contains 25,000 volumes and several ancient manuscripts, a museum of natural history, college, and theatre. The bishopric dates from the third century.

Auxerre is mentioned in the later periods of the Roman dominion in Gaul under the name of *Autissiodorum*. It was in the country of the Senones. After the fall of the Western Empire the city came under the dominion of the Franks. Under the Carlovingian dynasty the county of Auxerre, which was then co-extensive with the bishopric, was granted by the kings of France to the bishops of Auxerre; and by these the city of Auxerre was bestowed on the counts of Nevers to hold on condition of fealty and homage to the see. It was subsequently united to the crown of France in 1370.

AUXILIARY VERBS. An auxiliary verb is one which is used not independently but to help out the meaning of another verb with which it is conjoined. At an early period in the history of speech it is conceivable that every possible modification of tense and mood may have been expressed by a corresponding change or inflexion in the verb. But the wear and tear of time has rubbed away in all languages so many endings and prefixes, and has reduced to either absolute or comparative identity so many forms originally distinct, that in order to restore the havoc thus caused recourse has been had to supplementary words, to eke out the sense and avoid ambiguity. The same principle which has dictated the employment of prepositions as a substitute for lost case-endings, has likewise led to the use of auxiliary verbs to fill up the gaps in meaning caused by the phonetic decay of those verb-inflections, in which the varieties of mood and tense were originally sufficiently distinguished by the mere sound of the word. This principle once understood it will forthwith become apparent that the older a language is the greater will be the number of its verb-inflections, and the fewer its auxiliary verbs, though it would be impossible to point to a single known language, living or dead, in which no auxiliaries can be found. When, for instance, we compare the Latin *amem*, "I may love;" *amabo*, "I shall love;" *amari*, "I have loved;" *amato*, "let him love," with their English equivalents, we see at once that the Romans could convey by four several modifications of the root *ama*, love, a diversity of meaning which we can only express by

combining the word "love" with four distinct auxiliary verbs; and if we further consider such forms as *amariſsem*, "I might have loved;" *amavero*, "I shall have loved," we see that by a two-fold inflexion of a single verb the Latin language conveys in one word a meaning which we can only express by means of two auxiliaries. Yet even the Romans could not dispense with auxiliaries. They had lost the passive perfect inflexion, so that whereas the Greeks could say *gegraptai*, "it has been written," in a single word, the Romans could only express this by the periphrasis *scriptum est*. But even the Greeks were forced to adopt the same expedient sometimes; for while they could say *pephilēntai*, "they have been loved," if they had attempted to say *gegraphēntai* they would have stumbled on an unpronounceable form, and to avoid this they said *gegrammenoi eisin*. Other examples of auxiliaries in Latin are found in the phrases *credo pugnatum iri*, "I believe that fighting will take place," and *credo fore ut occidaris*, "I believe that you will be killed," where *iri*, passive of *ire*, "to go," and *fore*, future infinitive of the root *fu* (our *be*), are used to supply the lack of a future passive participle. From the above instances it will have become apparent that auxiliary verbs have or once had an independent meaning and employment of their own. But their employment as auxiliaries tends of necessity to limit, or in some instances finally to eliminate their use as independent words. Thus *may*, *can*, *shall*, *will*, *must*, and *ought*, in English have become either obsolete or defective as independent words; while the original force of a few survives in isolated cognate forms, e.g. *might*—"power," akin to *may*; or the German *schild*, "debt," akin to *soll* (our *shall*). In French again *aiderai* is really the infinitive *aider* + *ai*—"have." In Spanish not only *amaré*—"amur he, i.e. [to] love I have," but even *he de amar*, "I have to love" (I must love), is found. This usage has so weakened the independent meaning of the Spanish *he* (I have), that for other than auxiliary purposes *tengo* (Lat. *tenco*), "I hold," is used instead. Not content with this, the Spaniard says already *tengo que escribir*, i.e. "I have [what] to write," where *tengo* itself has sunk to the rank of a mere auxiliary. This constant tendency to ever increased explicitness is illustrated in a minor degree by the history of the auxiliary use of the Greek *Thelō*, "I intend," "I wish." In ancient Greek *Thelō graphesin* means "I intend to write," in modern Greek simply "I shall write;" but as the Greek of to-day sometimes wants really to say "I intend to write," he has to adopt in such a case a periphrasis, viz. *Thelō na graphō*, i.e. "I will that I write."

AUXONNE, a fortified town in the department of Côte-d'Or, in France, is situated on the left bank of the Saône, 201 miles S.E. of Paris, and 18 S.E. of Dijon. The streets are straight, and the fortifications serve as promenades. There is a fine bridge over the Saône; and at the end of it, on the side next the town, is a causeway 2400 paces in length, having twenty-three arches for allowing passage to the water in case of inundation. There are barracks, an arsenal, and a school of artillery. The trade of Auxonne is chiefly in wine, brandy, grain, melons, and wood; as well as in cloth and serges, which are sent to Lyons. In return, groceries, silk, and the wines of Mâcon are received. Auxonne was fortified by Vauban. Its name was formerly *Axonium* (i.e. *ad Sonam*), from its position on the Saône. The population in 1882 was 7000. There are in the neighbourhood quarries of marble and of various kinds of stone.

AVA. See KAVA.

AVA, the former capital of the Burmese empire, is situated on the Irrawaddy, which is here nearly 4000 feet broad. The city is divided into the outer and inner town, both of which were surrounded by walls, but which are now in a very dilapidated condition. In general the houses are mere huts thatched with grass. There are several

temples with gilded spires. The town was nearly destroyed by an earthquake in 1839, and is in a declining state.

AV'ALANCHES are the most dangerous and terrible phenomena to which the villages built on the flanks of high snow-topped mountain ranges, or in the valleys embosomed between them, are exposed. They are especially frequent in the Alps, owing to the steepness of the declivity. They originate in the higher region of the mountains, when the accumulation of snow becomes so great that it is pushed down the declivity by its own weight, and often destroys forests and villages in its course, buries men and cattle, and sometimes fills up the channels of the rivers. Four different kinds of avalanches may be distinguished—drift avalanches, rolling avalanches, sliding avalanches, and glacier or ice avalanches—of which the first commonly take place in the early part of the winter, the second and third at the end of winter and in spring, and the last only in summer. The *drift* or loose snow avalanches take place when heavy snow has fallen in winter in the upper region of the mountains during a calm, and this accumulated mass is detached by a strong wind from the heights where it lodges. The *rolling* avalanches take place when, after a thaw, the snow becomes clammy, and the single particles or flocks stick to one another so as to unite into large hard pieces, which commonly take the form of balls. Such a ball, moved by its own weight, begins to descend the inclined plane, and all the snow it meets in its course downwards sticks firmly to it. The snow-mass, increasing rapidly in its progress, and descending with great velocity, covers, destroys, or carries away everything that opposes its course—trees, forests, houses, and rocks. This is the most destructive of the avalanches, and causes great loss of life and property. The current of air which accompanies the rushing mass is even powerful enough to uproot trees. The *sliding* avalanches originate on the lower and less steep declivities, when after a long thaw in spring, those layers of the snowy covering which are nearest the ground are dissolved into water, and thus the bond is loosened which unites the mass to its base. The whole snowy covering of a declivity then begins to move slowly down the slippery slope, and to carry before it everything which is too weak to withstand its pressure. It is for this reason that the traveller so often sees a wedge-shaped patch of forest planted above an Alpine village, the point directed up the the mountain; for such a forest meets and divides the avalanches which would otherwise sweep away the village every year. The *ice* or glacier avalanches are nothing but pieces of ice which, loosened by the midday summer heat, break off from the principal mass, and fall with a noise like thunder. They are commonly broken into small pieces by the rocks which they meet in their progress. Avalanches is the common French expression for these natural phenomena. In Italian they are called *lavine*; and among the German inhabitants of Switzerland they are called *lawinen*. In the Pyrenees they are sometimes called *congères*; and in Norway, *snee-shred* and *snee-fond*. Copious descriptions of avalanches are to be met with in the works of most travellers in the Alps, Pyrenees, &c.

AVALLON, a town of France, in the department of Yonne, occupies an ancient site on the right bank of the Cousin, a feeder of the Cure, and has a civil tribunal, a college, and 6000 inhabitants. The town stands at the opening of a valley, shut in by vine-clad hills, 15 miles S.S.E. from Auxerre, and is well built, with wide, clean, and regular streets. The Church of St. Ladre, which dates from the twelfth century, is a fine specimen of Burgundian Gothic. The town contains several distilleries. Coarse cloth, oak staves, casks, leather, paper, and woollen yarn are among the industrial products. There is a good trade in corn, wine, firewood, wool, horses, and cattle.

AVANTURINE or **AVENTURINE** is a variety of quartz remarkable for the brilliancy with which it

reflects light, the effect being in general produced by fine points of mica imbedded within the crystalline mass. From this circumstance it is sometimes employed in jewellery. The Emperor of Russia presented Sir R. Murchison with a vase made of *avanturine*. It is now in the Jernyn Street Geological Museum, and is remarkable for its size, 4 feet high and 6 feet in circumference. No other specimen of the mineral of such dimensions is known, except one in the museum at Berlin. An artificial *avanturine* is made of glass, with minute crystals of metallic copper distributed through it. For a long period the secret of this manufacture was known only to the Venetians, but it has lately been shown that this beautiful imitation can be made by heating glass with protoxide of copper and iron scale (protoxide of iron); the latter reduces the protoxide of copper by combining with the oxygen to form the peroxide.

Avanturine feline has minute crystals of specular or titanic iron or limonite scattered through it.

AVARI, a people of eastern origin, probably a branch of the Turanian family, and allied to the Huns and Magyars, who made their appearance about a century later than the Bulgarians in the regions north of the Caucasus, between the Don, the Caspian Sea, and the Volga. About the middle of the sixth century they settled in Dacia, where they served under Justinian, and assisted the Longobards to destroy the kingdom of the Gepidae. Towards the close of the century, under the leadership of Khan Baján, they made themselves masters of Pannonia. Continuing to increase in power, they subsequently conquered Dalmatia, and their destructive incursions extended into Germany as far as Thuringia, and into Italy, where they were encountered by the Franks and Longobards. Their influence and authority extended over the Slavic nations north of the Danube, and over the Bulgarians as far as the Black Sea; but towards the middle of the seventh century these nations rose against them, and in 640 they were driven out of Dalmatia. They were subdued by Charlemagne in 796, and soon after this they were nearly exterminated by the Moravians, and as a distinct people they disappear from history early in the ninth century. Remains of their earthwork fortifications, termed *Avarian rings*, still exist in some of the countries which they formerly occupied.

AVAST, a nautical term borrowed from the Dutch *hou vast*, "hold fast"—often used, like the kindred expression "hold hard," in the sense of "leave off." Thus, "Avast heaving!" would direct a sailor to hold fast the rope, but cease to heave by it for the moment.

AVATAR is a Sanskrit word, which properly signifies "a descent," or "the act of descending," as from a boat or vehicle; but is particularly applied to the incarnations of the Hindu deities, or their appearance in some manifest shape upon earth. The doctrine seems to belong to a comparatively recent period in the development of the Hindu mythology. Those portions of the "Vedas," or sacred writings of the Hindus, to which, from the style and structure of their language, the highest antiquity may with safety be attributed, inculcate the worship of elements and deified natural powers, but do not allude to those apparently more spiritualized deities that require to be invested with a bodily frame to operate in the material world.

The number of the *Avatárs* mentioned in the "Puranas," or legendary poems of the Hindus, is very great. Those of Vishnu alone, who is distinguished by the character of "Preserver" in the Trimurti, or triad of the principal Hindu deities, are stated to be endless. There are ten which are particularly enumerated as the most conspicuous.

AVEBURY or **ABURY**, the name of a village and parish in Wiltshire, 6 miles W. of Marlborough, is remarkable as the site of what appears to have been one of the largest megalithic structures in Europe. The origin of the

name is uncertain; the last part, *bury*, a borough or fortified place, appears to be a Saxon word, and if so *Avebury* is not the original name of the place.

The immediate site chosen for this grand circular temple, as it appears to have been, is a flat area of ground, having an irregular range of gentle hills to the east, running north and south, a rising tract of land to the south, a level country of some miles in extent to the north, some undulating and rather high hills to the west. A small brook called the Kennet, a tributary of the Thames, has its source a short distance to the north. The geological characteristics of the district probably occasioned its being chosen for the erection of a temple of this description. On the surface of the ground, both in the neighbouring valleys and on the highlands, are numerous large masses of stone. From amongst these the makers of the temple selected such as seemed best adapted to their rude design.

No less than 650 blocks seem to have been brought together and placed in circles and rows. These stones were of various dimensions, measuring from 5 to 20 feet in height above the ground, and from 3 to 12 feet in width and thickness. One hundred were raised on end and placed in a circular form, within a flat and nearly circular area of about 1400 feet in diameter, and these stones were bounded by a deep ditch and lofty bank, which inclosed the whole work except at two places, where openings were left for entrances. The inner slope of the bank measured 80 feet, and its whole extent or circumference at the top was, according to Sir Richard Colt Hoare, 4442 feet. The area within the bank or mound is somewhat more than 35 acres. There were two other small circles within the periphery of the great circle. These were the component parts of the triple temple, as it may be called; but there were two connecting parts which gave a peculiarity to this work, distinguishing it from all other Celtic temples. These were avenues of approach, consisting of double rows or lines of upright stones, which branched off from the central work, each to the extent of more than a mile. The width of the southern avenue varied from 56 to 35 feet between the stones, which were on an average 86 feet apart from each other in their linear direction. The western avenue extended about $1\frac{1}{2}$ mile; its extremity ended in a point or with a single stone. These avenues or grand approaches to the temple were not arranged in straight lines, but in flowing or curved lines.

In addition to these structures, there are in the neighbourhood of Avebury numerous barrows or tumuli, with the cromlechs and the trackways. Among the first may be named a large barrow called Silbury Hill. This vast artificial conical mound of earth is regarded as the largest tumulus in Europe, though considerably smaller than the mound in Asia Minor spoken of by Herodotus (i. 93). It is a work which must have cost immense labour. The circumference of the hill, as near the base as possible, measures 2027 feet, the diameter at top 120 feet, the sloping height 316 feet, and the perpendicular height 170 feet; and altogether this artificial hill covers a space of $5\frac{1}{4}$ acres. There are many other barrows and cromlechs of various dimensions on the downs near Avebury.

Opinions have differed considerably as to the time when this singular work at Avebury was constructed, and the design of it. Formerly the general opinion was that it was raised by the Druids before the Christian era, and was a national temple in which they performed their sacred rites; but Mr. Fergusson maintains that the larger circle, or Avebury proper, and Silbury Hill commemorate the last of the twelve Arthurian battles, which was fought A.D. 520 at Badon Hill, which he identifies with Waden Hill.

AVEIRO, a small episcopal town in the province of Beira, in Portugal, 33 miles S. of Oporto. It stands on a gentle elevation, upon the banks of the river Vouga, which flows through the town, and is ornamented with a handsome quay. Aveiro is separated from the sea by a bar of sand-

hills formed by the tide of the month of the river Vonga, which forms a small haven. Over this bar vessels of 8 or 9 feet draught may conveniently pass. There are sardine, herring, and oyster fisheries. The small gulf opposite the town is covered with little islands, on which the inhabitants make salt. This article, oil, wine, oranges, and salt fish form their principal exports. The neighbourhood of the town is low and marshy, and ague is common, but not to such an extent as formerly, in consequence of improved drainage. Population, 6500.

AVELLA, a town of Italy, about 18 miles N.E. of Naples. Near it are the ruins of the ancient *Abella*, celebrated for its apples by Virgil (*Æneid*, vii. 740). The neighbourhood is still famous for apples and also for honey. It stands in a fine situation, and commands extensive prospects. Population, 4000.

AVELLINO, the capital of the Italian province of Avellino, 59 miles by railway from Naples. It is built on the declivity of a hill in a fine valley watered by the river Sabato, between two offsets of the Apennine chain. Three miles north of the town, on a rugged mountain, stands the celebrated sanctuary of Monte Vergine, once a rich Benedictine abbey; it was built in the eleventh century, on the ruins of a temple of Cybele. Avellino is a bishop's see, and a place of considerable trade in country produce, cattle, &c.; there are also manufactures of cloth, macaroni, and paper. It has a college, and contains the courts of justice. The population in 1882 was 22,920. The ancient *Abellinum*, a town of the Samnites, was nearly 3 miles distant from the present town. The province of Avellino abounds with fruit-trees, especially the apple and the hazel-nut. The latter was much esteemed in the time of the Romans, under the name of *Nux Avellana*.

A'VE-MARIA, the two first words of a prayer or invocation addressed to the Virgin Mary, which is frequently used by Roman Catholics in their orisons. It consisted first of the words used by the angel Gabriel in his salutation (Luke i. 28), viz. "Hail, Mary, full of grace, the Lord is with thee; blessed art thou among women, and blessed is the fruit of thy womb, Jesus," and in this form was used as an invocation during mass on the fourth Sunday after Advent. It was enlarged by Urban IV. in 1261; and the form now in use, which adds to the words already given, "Holy Mary, mother of God, pray for us sinners now, and at the hour of our death: amen," was sanctioned by Pius V. in 1508. It is generally used after the *Pater Noster*; and an edict was published in 1326 by John XXII., which commanded every Catholic to repeat three *Aves* morning, noon, and evening, when summoned by the ringing of the bells. This ringing of the bells is still called the *Ave-Maria* in Italy, but in most other countries is termed the *Angelus*. The name *Ave-Maria* is also given to the small beads of the rosary, as it is usual to count by them the prayers offered, the large beads marking the *Pater Nosters*.

AVENA, the genus of GRASSES to which the cultivated oat belongs. The genus is known by the lax panicles, the two loose membranous glumes, and by the small number of the florets, each of which has one of its husks or *pales* armed with a strong twisted beard or awn.

The common oat (*Avena sativa*) is that which is most generally cultivated for the use of man; like most other corn-plants, its native country is unknown. M. A. De Candolle, however, in "*L'Origine des Plantes cultivées*" (1883), considers that *Avena sativa*, *Avena strigosa*, and *Avena orientalis* are derived from a single prehistoric form of which the native country was eastern temperate Europe and Tartary. The flower of the wild oat (*Avena fatua*) has long yellow hairs at its base, and may thus be distinguished from the cultivated oat. The bristle-pointed oat (*Avena strigosa*) is found in corn fields; it is known by the lower pale ending in two long straight bristles. *Avena*

pratensis (the narrow-leaved oat-grass) has rough leaves and erect flowers; it grows on moors and in mountainous places. The downy oat-grass (*Avena pubescens*) occurs chiefly in limestone districts; the leaves have soft downy hairs. These are British species. *Avena orientalis*, in which the spikelets hang all on one side, has been cultivated in Europe since the end of the eighteenth century.

The following is the percentage composition of oatmeal as given by Professor A. H. Church in "*Food*" (1880)—water, 5·0; fibrin, &c., 16·1; starch, &c., 68·0; fat, 10·1; cellulose and lignose, 8·7; mineral matter, 2·1. "The proportion of protein compounds exceeds that of wheaton flour; and oats are richer in oily or fatty matter than any other of the cultivated cereal grains, with the exception of maize or Indian corn. Hence oats are among the most valuable of grains for dietetical purposes." (Bentley and Trimen's "*Medicinal Plants*," 1880.)

A'VENS is the common name for Geum, a genus of plants belonging to the order ROSACEÆ. The distinguishing marks of the genus are the following:—The calyx is ten-cleft in an outer and inner series; and the fruit consists of a number of achenes, with long awn-like jointed styles, hooked at the joining. Two species are natives of the British Isles. *Geum urbanum* (the wood avens or herb bennet) is about 2 feet high, with small yellow flowers; the upper leaves are each composed of three leaflets, but those springing from the ground have a number of lobes. The upper joint of the style has only a few minute hairs at its base, and is shorter than the lower joint. The root has a clove-like flavour, and from its astringency was given by herbalists for dysentery, &c. This "clove root" was also used to flavour ale. The water avens (*Geum rivale*) is about 1 foot high, and has large purplish-brown flowers. The fruit is separated from the calyx by a stalk, and the lower joint of the style is equal in length to the upper hairy joint. There are many species cultivated, a very handsome one being *Geum coccineum*.

AVENTINE, one of the celebrated "seven hills" of ROME. The Aventine was added by Ancus Marcius, fourth king of Rome, to accommodate the Latins whom he brought to Rome after conquering their towns. Thus grew up the ever famous Roman plebs, example and origin of the true democratic element. Servius Tullius included the Aventine within his walls of Rome, which embraced all the seven hills.

The Aventine lies along the Tiber, and is now quite deserted. The modern traveller can hardly believe at first that the considerable "Monte Testaccio" is no more than the accumulated breakage of wine jars and other crockery of the formerly teeming population, or that the silent shore was once that quay whose name, "Emporium," has passed into common speech. Some poor vineyards and a convent or two serve but to emphasize the contrast between then and now, for save for them the Aventine lies waste.

AVENTURINE. See AVANTURINE.

AVERAGE is a quantity intermediate to a number of other quantities, so that the sum total of its excesses above those which are less is equal to the sum total of its defects from those which are greater; or, the average is the quantity which will remain in each of a number of lots, if we take from one and add to another till all have the same—it being supposed that there is no fund to increase any one lot, except what comes from the reduction of others. Thus, 7 is the average of 2, 8, 4, 6, 18, and 14. Similarly, the average of 6 and 7 is 6½. To find the average of any number of quantities, add them all together, and divide by the number of quantities. Thus, in the preceding question, add together 2, 8, 4, 6, 18, and 14, which gives 42; divide by the number of them, or 6, which gives 7, the average.

The average of a set of averages is not the average of the

whole, unless there are equal numbers of quantities in each set averaged. For instance, if ten men have on the average £100, and fifty other men have on the average £300, the average sum possessed by each of the sixty individuals is not the average of £100 and £300; for the ten men have among them £1000, and the fifty men have among them £15,000, being £16,000 in all. This, divided into 60 parts, gives £266 18s. 4d. to each. A neglect of this remark might lead to erroneous estimates.

AVERAGE, in marine insurance, means either some contribution in equitable proportion, which is to be made by all parties concerned towards losses and expenses which have been incurred for the advantage of all; or some contribution to be made by the assurers for partial loss or damage sustained by the property insured. If any part of the ship or furniture, or of the goods, is purposely sacrificed for the sake of saving the rest, all parties interested must contribute towards the loss. This contribution is properly called average. It is sometimes called *general* average, in opposition to *special* or particular average, which is the contribution towards any kind of partial damage or loss; or *gross* average, in opposition to *petty* average, which is the contribution mentioned in the bill of lading towards the sums paid for beaconage, towage, &c.

The principle of average is recognized in the maritime law of all nations. It was introduced into the Roman civil law from the law of Rhodes ("Dig." 14, tit. 2; "Lex Rhodia de Jactu"). If goods are laden on deck no average is recoverable in respect of the loss occasioned by throwing them overboard, unless by the usage of trade such goods are usually so laden. If a ship is voluntarily stranded for the purpose of saving her and the goods, and afterwards gets off safely, the expenses incurred by the stranding are the subject of general contribution; but if the ship be wrecked in consequence of the voluntary stranding, the wrecking, not being voluntary, is therefore not such a loss as calls for a general contribution.

The things upon which average is payable are the ship, boats, furniture, &c., but not provisions or ammunition; also all merchandize, to whomsoever belonging, which is on board for the purposes of traffic, but not the apparel, jewels, &c., of parties on board for their own private use. The freight due at the end of the voyage is also subject to average. The goods are to be valued at the price for which they would have sold at their place of destination. If the ship, by reason of what happened when the average was incurred, return to her port of lading, and the average is there settled, the goods are to be valued at the invoice price. The losses incurred by the ship and furniture, &c., are calculated at two-thirds of the price of new articles. See **ADJUSTMENT**.

Average bond is a deed executed by parties liable to a general average, by which they empower an arbitrator to value the property lost, and fix the proportion which shall be borne by each.

AVER'NO or **AVER'NUS**, now called *Lago d'Averno*, a lake in the neighbourhood of Naples, near the coast of the Gulf of Baie. It is a circular sheet of water, about 1½ mile in circumference. The water is clear and of great depth, and the lake is surrounded with high banks, which are covered with vineyards and gardens. On the south-eastern side is a break through this high margin, where there was formerly a channel communicating with the Lucrine Lake. The scene, though secluded, is serene and pleasing, very different from the gloomy descriptions found in ancient poets, and even historians, of the impervious darkness and foul mephitic emanations of this lake. It is likely, however, that when the surrounding banks were thickly covered with forest trees overhanging the water, it may have had a much gloomier appearance than at present. It was regarded by the ancients as an entrance to the infernal regions, and was especially dedicated to Proserpine.

Here also was the grotto of the Cumæan sibyl. The story of the mephitic exhalations which killed the birds that attempted to fly over the surface of the lake (Virgil, vi.), although evidently exaggerated, may at one time have had some foundation in truth, as the whole region is of volcanic formation, and emits volcanic exhalations. Indeed, the lake itself is the crater of an extinct volcano. The name, in Greek, means "without birds." In the time of Virgil a communication was opened between Avernus and the neighbouring Lake Lucrinus, which, itself communicating with the sea, was converted by Agrippa into a fine harbour, called *Portus Julius*. The Lucrine Lake was filled up by an eruption which took place in 1538, when a conical mountain rose in its place, which is called *Monte Nuovo*. Averno has thus become again a separate lake; and a small muddy pool half filled with reeds, and close to the sea-coast, is all that remains of the famed Lucrinus. There are several mineral springs in the immediate neighbourhood of the Lake of Averno, some of which are used as baths. The most celebrated are those called the Baths of Nero, which are close by the sea-shore, and consist of galleries worked through the rock, and terminating in a fountain of hot water strongly impregnated with sulphur, so hot as to boil eggs immersed in it, and the vapours of which fill up the whole place. The ruins of Cumæ are about a mile west of Averno, and the grotto of the Cumæan sibyl is still to be seen.

AVERRHO'A, a genus of plants belonging to Oxalidææ, or the wood-sorrel tribe, and to the order GERANIACEÆ. It consists of two species, both of which form small trees in the East Indies. They are remarkable for their leaves, which are pinnated, possessing in a slight degree the kind of irritability found in the sensitive plant, and for their fleshy oval fruits, with five thick longitudinal wings. From other Oxalidææ they are known by this character, independently of all others.

In the carambola (*Averrhoa Carambola*) the leaves are smooth, the flowers of a violet purple, and the fruit about the size of a goose's egg; it is of a pale yellow colour, and is agreeably acid.

The blimbing (called *Averrhoa Bilimbi*) has downy leaves, and fruit resembling a small cucumber. The latter is intensely acid, and cannot be eaten raw. It is pickled or candied, or a syrup is obtained from it by boiling with sugar. The juice is found an excellent agent for removing iron-moulds or other spots from linen.

AVERRO'ES or **AVERRHO'ES**, or, with his complete name, *Abul-Valid Mohammed ibn Ahmed ibn Mohammed ibn Roshd*, was an Arabian philosopher and physician of great celebrity, who lived during the latter part of the twelfth and the beginning of the thirteenth century. He was born in A.D. 1149, at Cordova, where his father filled the high office of mufti or chief judge and priest of Andalusia. Some of the most distinguished Arabian scholars of the age are mentioned as his teachers. He devoted the greater part of his time to philosophy and medicine, and read history or poetry only for recreation. Averroës adopted the creed of the Ashari sect, the main principle of which is that God, being the cause of everything, is also the author of all human actions; but that men, being free, either acquire merit or incur guilt according as they obey or disobey the precepts of religion. Averroës succeeded his father as mufti of Andalusia, and at the same time delivered lectures at Cordova. He was afterwards appointed chief judge of Mauritania; but Ibn Zohar the Younger charged him, at the court of Mansur, the Almoravide sovereign of Morocco and Spain, with having expressed heretical opinions. Averroës lost his office and was forced publicly to recant the heretical doctrines with which he was charged. He went first to Fez, and afterwards to Cordova. But the judge who had succeeded him in Mauritania gave so little satisfaction that Averroës was

reinstated in his former office, which he continued to fill till his death. He died in Morocco, probably in 1198.

Averroës entertained the highest respect for Aristotle, whom he regarded as the greatest of all philosophers, and translated his principal treatises into Arabic. The works of Averroës were very numerous. An edition in Latin was published at Venice, 1562, in eleven volumes folio. His commentaries on Aristotle and on the "Republic" of Plato seem to be the most generally known; but he composed likewise original treatises on philosophical subjects, and on Mohammedan theology and jurisprudence. Among his medical works, the "Kulliyat" ("The Total," or Comprehensive System) is the most important.

AVERSA, a thriving town and bishop's see, situated in a fertile plain 12 miles N. by W. of Naples, on the railway to Foggia. It is a bustling, lively place, with a population of 21,000 in 1882. The town is famous for its foundling hospital (orfanotrofio) and lunatic asylum. The inmates of the former are all taught some trade or useful branch of industry. The lunatic asylum was founded by Murat, and the treatment of the patients is described as humane, ingenious, and eminently successful; they are occupied in various pursuits congenial to their respective tastes; they have music, a fine garden, and other amusements. The territory of Aversa is very fertile in corn, grapes, fruit, &c. The light and rather acid wine of Aversa, called *Asprino*, is frequently drunk at Naples. The town occupies the site of the ancient *Atella*, where the *fabula Atellana*, or early Roman comedy, first originated. In 1029 it was the first settlement of the Normans, who afterwards became so powerful in southern Italy.

AVESNES, a town of France in the department of Nord, is situated on the Helle, a feeder of the Sambre, in the former territory of Hainaut, 51 miles S.E. from Lille. The town is well built, and has a civil tribunal, a college, and 3700 inhabitants, who manufacture hosiery, soap, leather, and bricks; there are also salt refineries, marble works, and in the neighbourhood iron mines, iron forges and smelting furnaces, naileries, and glass works. The church has a spire 330 feet in height. Much of the town was destroyed by the explosion of a powder magazine during the siege by the Prussians in 1815, but was afterwards rebuilt.

AVEYRON, a department in France, which coincides with Rouergue, a country in the ancient province of Guienne. It is bounded N. by the department of Cantal, E. by those of Lozère and Gard, S. by those of Hérault and Tarn, and W. by those of Tarn-et-Garonne and Lot. Its greatest length from N. to S. is 90 miles; from S.E. to N.W. 78 miles. The area contains 3429 square miles. The population of Aveyron in 1882 was 415,075.

The department is mountainous, and has a general inclination from E. to W. The north is crossed by the Lot, which enters the department on the E., and running N.W. passes St. Geniez, Espalion, and Entraugues, where it receives the Truyère from the N., and becomes navigable; it then turns W., and before leaving the department receives the Dourdou from the S. The central part is crossed by the Aveyron, which, rising near Séverac-le-Château, and flowing W., passes Rodez and Villefranche; it then runs S. till it reaches the borders of the department, where, taking a western direction, it enters the department of Tarn-et-Garonne, and falls into the Tarn below Montauban, after a course of about 140 miles, no part of which is navigable. The chief feeders of the Aveyron on the right are the Serre, the Alzon, and the Cande; on the left the Viour, the Céron, and the Verre. Further south the department is crossed by the Tarn, which passes Millau, and having received the Dourbie, the Lorgue, and the Rance, all on its south bank, enters the department of Tarn on its way to join the Garonne.

The north-east of the department between the Lot and

the Truyère is covered by the mountains of Aubrac, an offshoot from the Margeride chain which unites the Cévennes with the mountains of Cantal. This district is volcanic, and everywhere presents evidence of having formerly been in a state of violent eruption. The climate is cold, and the winter long and severe. Rye and oats are the only corn grown in this region, and cattle and oats the only articles of trade. Between the Lot and the Aveyron there is another mountain mass containing some fertile valleys, and many round-topped summits which are planted with trees. Rye, oats, some wheat, and a great quantity of chestnuts and plums are grown here. This district has rich beds of coal, one of which having been accidentally set on fire, burned for many years, and presented at night the appearance of a volcano. Between the Aveyron and the Tarn rise the mountains of Levezou, the northern side of which is almost perpendicular and uninhabited, while the southern side slopes down gradually to the Tarn, and contains some hamlets, each of which is surrounded by a patch of cultivated land yielding rye, oats, and buckwheat. This whole region, however, is barren and desolate, and the surface is in most places covered with furze, fern, or broom. The mountains to the south of the department are a continuation of the Cévennes, and their northern slope consists mostly of high table-lands, inclining to the Tarn. One of these high plains, called Larjac, which lies between the Dourbie and the Sorgue, is remarkable for its extent, and for the number of rocks of cubic and pyramidal form with which it is strewn. The soil of this district is calcareous, and produces abundant pasture for sheep, which for flesh and fleece are not surpassed in France. This part of the Cévennes abounds in grottoes, and contains slate, plaster of Paris, and potter's clay. The west of the department consists of plains having a general inclination westward; rye, oats, truffles, and a little wheat are produced, and cheese is made. The east of the department is in general warm, the land is good, farms are large and well cultivated, and much wine is produced. The wine of the department is, however, with a few exceptions, disliked for its earthy taste. Horses and horned cattle are very numerous, but of inferior breed. Great numbers of excellent mules are reared; and goats, sheep, and swine are very numerous. The rivers are well stocked with trout and other fish. Of large game there is little, but hares and rabbits abound in the heaths; among the reptiles are adders, vipers, and snakes.

Besides its rich coal-fields the department contains mines of copper, lead, zinc, sulphur, antimony, iron, and alum. The lead ores are rich, and contain a considerable quantity of silver. Marble, rock-crystal, kaolin, millstone, grit, flint, emery, chalk, marl, plaster of Paris, &c., are found. There are several mineral and hot springs. The abundant water-power of the department is applied to good purpose in various factories for the manufacture of paper, iron, cotton, leather, woollen stuffs, &c. The trade of the department is in the mineral and industrial products already named, together with corn, plums, chestnuts, almonds, wax, bacon, cattle, hides, wool, hemp, timber, turnery, oak planks, &c. Cheese also, made of ewes' milk mixed with that of goats, is manufactured in great quantities in the south of the department, especially in the neighbourhood of Roquefort, and forms an important article of export.

The department is divided into five arrondissements, viz. Rodez, Espalion, Millau, St. Affrique, Villefranche.

AVIARY, a place for keeping birds. Its proper arrangement depends upon the habits of its inmates, the climate suited to them, and other circumstances. They are of all sizes, from the small domestic cage up to the large and elaborate arrangements adopted in zoological gardens.

AVICEBRON, a rather late contemporary with AVI-

CENNA, was not, as is often stated, an Arabian, but a Jew. His true name was Ibn-Gebirāl. Curiously enough his "Fons Vitæ" was neglected by both Jews and Mussulmans, but found immense popularity amongst the Christians of the thirteenth century. M. Munk, in his learned and accurate "Mélanges de Philosophie Juive et Arabe" (Paris, 1859), gives the best account of Avicbron, and indeed of what is misnamed "Arabian" philosophy, which has yet been written. This important movement was really a reaction against Islamism arising in the distant quarters of the empire. The true Moslem feeling is against philosophy; it is thoroughly Semitic—that is to say, lyrical, prophetic, and emotional, averse to abstraction and scientific details. Therefore the Persians, Spaniards, and Jews, who under various Mohammedan assumed names rendered the Arabian language famous for a century or so, did this in spite of their apparent nationality, not because of it. The language is Arabian, the thoughts are Greek. Only one of all the men who did such yeoman's service in the preservation of science and philosophy in the dark ages was truly an Arab, that is Al-Kendi, who flourished in the ninth century, under Haroun-al-Raschid, whom we know in the romances of the "Arabian Nights." In the tenth century Europe seemed to have sunk into the uttermost abyss of darkness. Where now were the works of Aristotle or of Plato? One in England might truthfully deny the existence of such men, so far as he knew. Yet in Spain, in Andalusia, these men were revered; and the caliph's agents ransacked Cairo and Alexandria for manuscripts, to be translated into Arabic when found, and eagerly devoured. Roger Bacon a century later was almost the first to free Aristotle from the fetters of Arabian translations, or rather from those doubly forged fetters of the retranlations from the Arabic. But the caliph and their literati had rendered Roger Bacon possible; without them it is quite probable that the ancient Greek civilization might have perished as utterly as that of Babylon or of Nineveh. Bacon repeatedly quotes the treatises of Al-Farabi and those of the greater subject of this article, Avicbron; and others of the cultured "Arabians" were his guides also amid the darkness.

Avicbron flourished about the year 1000, contemporary, as above said, with Avicenna, and a little later than Al-Farabi; and probably he, though a Jew, was the chief instrument for making effective the European influence of the Arabian (that is, in fact, the preserved and modified Aristotelian) philosophy. The perpetual dangers to which Jews were exposed during the dark ages, suggests M. Munk, made them able to find peace and repose only in meditative and philosophic studies, and the increased grasp of intellect thus attained raised them to the position of the real rulers—as physicians, as bankers, and as philosophers—of those whose slaves they seemed to be.

The bold speculations of Avicbron were so far in advance of his age that M. Lewes is able to say that "the student who reads M. Munk's analysis will be struck with the familiar faces of speculations which he has attributed to modern Germans" ("Hist. of Phil.", 1880, i. 64).

AVICENNA (*Ibn Sina*, or, with his complete name, *Al-Sheikh Al-Rayis Abu Ali Al-Hossein ibn Abdallah ibn Sina*) was a celebrated "Arabian" philosopher and physician. He was born at Kharratain, near Bokhara, A.D. 980. Soon after his birth his parents removed to Bokhara, where Avicenna received his first education. Ebn Khalikan informs us that, when he had reached his tenth year he was thoroughly versed in the study of the Koran, and knew something of the elements of Mussulman theology and of Hindu arithmetic (*Kisab ul-Hind*) and algebra. Under Abu Abdallah Al-Natholi he studied logic, Euclid, and the Almagest. When Al-Natholi left Bokhara, Avicenna, then about sixteen years old, began to turn his attention to medicine. In his twenty-first year he wrote his "Kitab al-Majma", literally "The Book of the Sun

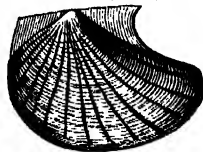
Total;" and he compiled a commentary to it, in about twenty volumes. When he was twenty-two years old Avicenna lost his father, whom he succeeded in the office of minister to the Sultan of Bokhara; but after the downfall of the Samanide dynasty, about the beginning of the eleventh century, he quitted Bokhara, and settled successively at various places. He was for a time attached as physician to the court of the Dilemite sovereign, Shams-ul-Maali Kâbûs ibn Washmgir. When this prince was dethroned, about A.D. 1012, Avicenna retired to Jorjan, where he began to write his celebrated treatise on medicine known under the title of the "Canon" ("Kitâb al-Kânûn fil Tibb," "Book of the Canon in Medicine.") He subsequently lived at Rai, Kazwin, Hamadan, and lastly at Ispahan, when he became physician to Alâ ed-Daulah, the sovereign of Ispahan. He died at Hamadan, to which place he had accompanied Alâ ed-Daulah, being then fifty-eight years old. The writings of Avicenna, chiefly on philosophy, mathematics, and medicine, are very numerous. Among them the "Kânûn" acquired the greatest celebrity, and became, even in Europe, for many centuries the standard authority in medical science, less on account of original merit than on account of its judicious arrangement, and the comprehensive view which it afforded of the doctrines of the ancient Greek physicians, at an age when the knowledge of the Greek language was very scanty. It was translated into Latin by Gerardus Cremonensis at Toledo. This translation, revised and accompanied with a commentary by Jacobus de Partibus, was edited for the first time in 1498 at Lyons, in four large volumes folio, by two Germans, Johannes Trechsel and Johannes Klein; several other editions have since appeared, the latest at Venice in 1585, fol. An edition of the Arabic text of the "Canon" was published at Rome, 1593, fol. (Casiri, "Bibliotheca Arabico-Hispana;" Sprengel, "Hist. de la Médecine," trad. par Jourdain.

AVICENNA is a genus of plants belonging to the order VERBENACEÆ. The species are natives of Australia and America. *Avicennia tomentosa* (the white mangrove) contains tannin, and is used in Rio Janeiro for tanning. *Avicennia officinalis* is a native of New Zealand, and yields a green resinous substance that is eaten by the New Zealanders as food. It is remarkable also for its clusters of large flowers. *Avicennia nitida*, a native of Martinique, is used for foundations of buildings, as it resists damp.

AVICULA is a genus of bivalve shell-fish belonging to the family AVICULIDÆ. The valves are very unequal, and in shape are obliquely oval.

Below the anterior ear of the right valve there is a notch for the protrusion of the *byssus*; the cartilage is lodged in a single oblique pit in the hinge-line. The pearl-oyster and hammer-oyster belong to this genus. Among fossil forms, *Avicula cygnipes* and *Avicula inequalis* are found in the Lower Lias beds, *Avicula contorta* in the Rhetic beds, and *Avicula Daubyi* in the Silurian formation. See PEARL-OYSTERS.

AVICULIDÆ, or Wing-shells, are a family of molluses belonging to the LAMELLIBRANCHIATA. Amongst these shells are the well-known pearl-oyster (*Avicula*), hammer-oyster, pinna, perna, and inoceramus. They are natives of temperate and tropical seas, and fossil species have a world-wide distribution. The shell rests on the right valve, which is smaller than the other; the foot is small and finger-like, used, not for locomotion as it is with the river mussel, but for spinning the *byssus* by which the animal attaches itself to foreign bodies; there are two crescent-shaped gills on each side; the mantle-lobes are free, with fringed margins;



Avicula Daubyi.

the *pallial line*, produced in the interior of the shell by the muscular fibres of the mantle-margin, is broken up into irregular spots; the anterior muscular impression is small, and situated within the beak (*umbo*); the posterior is large and almost central; the beaks are eared, the posterior ear being wing-like; the hinge-line is long and straight; the hinge-teeth are wanting or very obscure; the outer layer of the shell has a prismatic-cellular structure; the inner layer is pearly, and this is entirely lost in many fossil *Aviculidæ*, e.g. in all those found in the chalk.

AVIENUS or **AVIANUS**. Under one or other of these names we have a collection of fables in Latin elegiacs; translations of Aratus and of Dionysius, and a poem in iambs, entitled "*Ora Maritima*," of which only the first book remains, containing a description of the Mediterranean, from the Straits of Gibraltar to Marseilles. The fables commonly bear the name of Flavius Avianus; the other works that of Rufus Festus Avienus. The identity of these two persons is largely discussed in the dissertation annexed to the edition of Avianus's Fables, by Henry Canegieter (Leyden, 1731). The translations from Aratus are printed in the edition of Aratus by Bulle (Leipzig, 1793, 1801). The "*Descriptio*" was edited by Friesenann (Amst. 1786), and with the "*Ora Maritima*" is contained in the Oxford edition of the "*Minor Greek Geographers*." The author of these works appears to have lived about A.D. 400; Avianus the fabulist is placed, by those who deny his identity with Avienus, about 210 years earlier.

AVIGLIA'NO, a town of South Italy, about 10 miles N.W. from Potenza. It stands on the slope of a hill, and has a fine collegiate church. The surrounding country has some rich pastures, and the breed of cattle reared in them is the best in Italy. Population, 10,000.

AVIGNON, the capital of the department of Vaucluse, in France, is situated on the left bank of the Rhone, just above where it is joined by the Durance, 426 miles S.E. of Paris. The population in 1882 was 38,000.

Avignon (in Latin, *Arenio*) is a very ancient city. It was in the territory of the Cavares, from whom it was called *Arenio Cararum*. It came into the possession of the Romans at an early period of their dominion in Gaul, and a Roman colony appears to have been established here. Upon the downfall of the Western Empire it was taken by the Burgundians, and afforded to the king of that people a secure asylum from the power of Clovis, king of the Franks, who besieged it in vain. It subsequently became subject to the Ostrogoths, Franks, and Saracens. Afterwards it came into the hands of the kings of Arles and Burgundy. It was an object of contention between the counts of Provence and Toulouse, who at last agreed to hold the city conjointly, and to divide its dependencies between them. Part of the dependencies was also held by the counts of Forcalquier: but the last of that family bequeathed his portion to the citizens of Avignon, who were enabled by this accession to their resources, and by the dissensions of the counts of Provence and Toulouse, to acquire a kind of independence. But when the domains of the two last-mentioned nobles came by marriage into the hands of Charles and Alphonso, brothers of Louis IX. of France, Avignon was obliged to submit, and was included in the county of Provence.

In 1309 Pope Clement V., himself a native of France, removed his court from Rome to Avignon, which continued to be the Papal residence until Gregory XI., in 1376, left it to return to Rome. In the schism which took place on the election of Urban VI., successor of Gregory, Avignon became the residence of the anti-popes Clement VII. and Benedict XIII. The latter was driven out in 1408 by the French, who were tired of the schism. [See *ANTI-POPE*.] Clement VI. in the year 1348 purchased the city of Joan, countess of Provence and queen of Sicily (but the price was never paid); and the sovereignty was retained by his suc-

cessors in the Papal chair until the town was seized by the French in 1791, since which it has belonged to France.

Avignon is pleasantly situated in a valley, which is adorned with meadows, orchards, and mulberry plantations. The city is surrounded on the land side by a promenade, planted with elms, which runs outside the walls. The lofty mediæval walls, with their thirty-nine watch-towers, are very perfect and picturesque. In the twelfth century a stone bridge was built over the Rhone, by which the city was joined to Villeneuve and the fortress of St. André, on the right bank of the river. The work was undertaken and commenced by St. Benezet, a shepherd boy of eighteen, but he did not live to see the completion of it. It had nineteen arches, and was regarded as a wonderful structure on account of the breadth, depth, and rapidity of the river. In 1669 it was almost entirely carried away by an inundation, and only four arches, which still remain, were left entire. The river is now crossed by a remarkably fine suspension bridge.

While under the Papal dominion, Avignon had sixty churches and a great number of religious establishments, most of which no longer exist. The cathedral crowns the summit of the *Rocher des Doms*, which rises 194 feet above the Rhone; it is by no means of uniform architecture. Its portal is supposed to have been removed from an ancient temple of Hercules. The interior is adorned with several pictures and sculptures; among the latter is a fine statue of the Virgin by Pradier. Among the tombs which it contains are those of Benedict XII., John XXII., and "Crillon the Brave." The Church of the Cordeliers was celebrated for the tomb of Laura de Sade, the Laura of Petrarca. The same tomb contained also the body of her husband, Hugues de Sade. The site of the church and its inclosure is converted into a fruit-garden, and a small cypress tree marks the spot where Laura is interred. But the most remarkable structure in Avignon is the former palace of the popes. It is built on the southern slope of the *Rocher des Doms*. Its extent, imposing grandeur, the thickness of its walls, which are 100 feet high, its numerous towers and means of defence, render it the most complete model of the military architecture of the fourteenth century. It is now used as a barrack.

Avignon is still remarkable for the number of its charitable and useful institutions. It has an infirmary for soldiers whose wounds require a milder climate than that of Paris, a lunatic asylum, a college and society of arts, a fine collection of paintings and antiquities, a museum of natural history, a handsome hotel de ville, erected in 1862, a botanical garden, and a public library of 80,000 volumes and 700 MSS.

The town is clean, the houses are of stone and well built, but some of the streets are narrow and crooked. The trade of Avignon has been making considerable progress for some years past. Silk stuffs of various kinds are largely manufactured; of taffeta alone, 5,000,000 yards are annually made; there are also iron foundries, a saltpetre refinery, tanneries, paper-mills, type-foundries, cotton factories, and various other industrial establishments in the town. Avignon has also a large trade in books, corn, wine, brandy, sumac, colonial products, and cattle. A great part of the trade of Avignon is carried on through the port of Marseilles, to and from which goods are conveyed on the Rhone.

The bishopric of Avignon dates from the first century of our era. In 1474 or 1475 Sixtus IV. raised the see to an archbishopric.

Avignon has a special interest to Englishmen, as being the burial place of the eminent philosopher and political economist, John Stuart Mill. It had been Mr. Mill's custom for many years to reside in the city during the winter and spring, and he died there 8th May, 1873.

Of the dreadful *Glacière-horror* of Avignon, Carlyle ("*French Rev.*," vol. iii.) gives one of his lightning-flash

sketches, which stamps the scene indelibly upon the mind of the reader. L'Escuyer, a leading patriot, insulted the aristocrat-papal party by a harangue from the altar-steps, during mass, on Sunday, 16th October, 1791, whereupon a riot, chiefly led by women, arose and raged round him, perhaps not unnaturally. Jourdan, the headsmen (*coupe-tête*), was in command of the National Guard, and was hurriedly appealed to for help. "But heavy Jourdan will seize the town-gates first; does not run treble fast as he might; on arriving at the Cordeliers Church the church is silent, vacant; L'Escuyer all alone lies there, swimming in his blood, at the foot of the high altar; pricked with scissors, trodden, massacred;—gives one dumb sob, and gusps out his miserable life forevermore."

Whereupon, by Jourdan, "aristocrats, male and female, are haled to the castle; lie crowded in subterranean dungeons there, bemoaned by the hoarse rushing of the Rhone; cut out from help;" and a brigand court-martial sits on them. Brigand, we say, for that was the favourite appellation of Jourdan and his gang. "Brigand executioners, with naked sabre, waiting at the door for a brigand verdict. Close by is the dungeon of the *Glacière*, or Ice-tower: there may be deeds done—?" In the end the regular soldiers were sent to restore order, General Choisi at their head—Dummartin, serving under him, fortunately giving us an account of the whole matter. "So the Choisi Grenadiers enter with him there. They start and stop, passing that *Glacière*, snuffing its horrible breath, with wild cries of 'Cut the butcher down!' and Jourdan has to whisk himself through secret passages and instantaneously vanish. Be the mystery of iniquity laid bare, then! A hundred and thirty corpses, of men, nay of women and children, lie heaped in that *Glacière*; putrid, under putridities; the horror of the world. For three days there is mournful lifting out and recognition; amid the cries and movements of a passionate southern people, now kneeling in prayer, now storming in wild pity and rage: lastly there is solemn sepulture, with muffled drums, religious requiem, and all the people's wail and tears."

AVILA, one of the four provinces into which Old Castile, in Spain, was divided. It is bounded E. by Segovia, W. by Salamanca, S. by Toledo, and N. by Valladolid. The province is the most elevated in the central part of Spain, particularly in its southern extremity, where it is mountainous, cold, and very thinly peopled. The northern districts are milder, more productive, and better inhabited; but they are deficient in fuel, which is supplied from the forests in the south. The principal rivers are—the Adaja, a feeder of the Douro, which crosses the province from E. to W. as far as the city of Avila, from which its course is from S. to N.; and the Albercher, which flows through it from W. to S.W. on its way to join the Tagus, near Cazalegas, in Toledo. The area of the province is 2600 square miles, and its population is about 180,000. Agriculture is in a very backward state. The chief products are grain, fruit, oil, wine, flax, and wool.

AVILA (ancient *Abula*), the chief town of the above province, stands on a high plain on the right bank of the Adaja. It is surrounded by old walls. The streets are very irregular, but well paved and clean. The town is ornamented with many fountains, and has a good promenade in the suburbs. Avila is the seat of a bishop, and contains eight fine old churches and a university. The cathedral was founded in 1007. There are at Avila manufactories of woollen stuffs, the machinery of which is moved by water. The population is 7000. On all sides the town is surrounded by a tawny desert, over whose arid plains numbers of gray boulders are scattered like flocks of sheep. It was formerly one of the richest cities of Spain.

AVLONA or **VALONA**, a town in Albania, on the Gulf of Avlona, which is formed by the headland known to the Greeks and Romans as the Acro-Cerannian Promontory,

and now called Capo Linguetta, or Glósa. The town is $1\frac{1}{2}$ mile from the sea, and has a pleasant appearance, with its minarets and palace, surrounded with gardens and olive groves. Its long connection with Italy has given to it the appearance of an Italian town. The harbour is good, and is protected by the island of Sasseno. The imports are fire-arms, glass, and paper; the exports consist of corn, wool, oil, and more especially of pitch from the asphalt mines of Selenitza, which is about 8 miles N.E. of Avlona. The material imported into England as valonia is the pericarp of an acorn produced in the district. The population is about 8000, many of whom are Italians. Avlona was known to the ancients by the name of *Aulon*.

AVOCADO or **AL'IGATOR PEAR** is the fruit of *Persea gratissima*, a native of the West Indies and tropical America. The tree is about the size of an apple-tree. The fruit is the size of a large pear, and is regarded as one of the best produced in the West India Islands. In the inside it is yellow, and contains a kernel inclosed in a firm pulp. It resembles the peach, but is more agreeable, though not so sweet. It is sometimes eaten with pepper and salt, but more frequently with a little sugar and lime-juice. Oil used for lamps and soap-making is expressed from the pulp. An indelible marking ink is made from the seeds. According to Barham, "If you take the stone of the seed and write upon a white wall, the letters will turn as red as blood, and never go out till the wall is whitewashed again, and then with difficulty." *Persea* is a genus of the order LAURINEÆ.

AVOCAT, a French word, derived from the Latin *advocatus*, and corresponding to the English "counsellor-at-law." [See **ADVOCATE**.] From the middle of the fourteenth century the avocats were distinguished into "avocats plaidans," who answer to our barristers, and "avocats consultants," called also "juris-consultes," a kind of chamber-counsel, who merely give their opinion on intricate points of law. Previous to the Revolution the advocates of Dijon, Grenoble, the Lyonnais, Pèrez, and Beaujolais were entitled to rank as nobles; in some places this order was freed from the demands of the farmers of the king's taxes. Under the old monarchy the avocats were distributed, with regard to professional rank, into various classes. The order of avocats was suppressed by a decree of the 11th September, 1790. The persons who performed the functions of counsel were then termed *hommes de loi*, and any one might act as counsel. In 1795 something was done by the French Directory to reorganize the bar, and in December, 1810, another step was taken in the same direction. Napoleon had a great aversion to the bar, and when the Legion of Honour was established not a single advocate received the decoration; but they were more favourably treated under the Restoration.

All avocats must be bachelors-at-law, and must have taken the oath before the court. There is a roll of the advocates practising in each court. Candidates are admitted by the Council of Discipline after a probationary term. The members of the council are elected by the advocates inscribed on the roll. The "avoués" (attorneys) also have authority to plead when the number of advocates is not sufficient for the despatch of business.

AVOCET belongs to the SNIFE family in the order GRALLÆ, and is distinguished by the form of the bill, which is long, slender, tapering, and bending upwards at the tip, which is very flexible. The legs are long and slender, and the three anterior toes are united by a web. The bird does not swim, but uses its webbed feet to aid its progression through the mud of the marshes—its usual haunts. The loral space is white; the neck and fore part of the breast are reddish brown; the lower parts are white; the wings are black, with a broad band of white.

The common avocet (*Recurvirostra Avocetta*) is a native of Asia and Africa, and visits Europe as a bird of passage.

It abounds in Holland, and formerly was not uncommon in the fens of Lincolnshire and the more marshy parts of our island, but it has now become extremely rare. One species of avocet is found in the Andes of South America. The nest is merely a slight depression sheltered by such herbage as the morass affords. The eggs are greenish, spotted with black. During the summer the avocets are scattered in pairs, but on the approach of winter they assemble in



The Avocet.

small flocks, frequenting muddy shores and the mouths of rivers in quest of food. They feed upon marine insects, minute shells, and crustacea, wading in the shallows, and swimming when suddenly out of their depth. Their slender, elastic, recurved bill, resembling whalebone, enables them to pick up from the surface of the slimy ooze the minute insects on which they feed; and during this operation they appear as if incessantly beating the water with the beak. The flight of this bird is rapid, and all its actions are quick and lively. Like the lapwing it draws off the intruder from its nest by artifice, uttering loud cries. The plumage of the avocet is elegantly pied with black and white. It measures about 18 inches in length.

AVOIDANCE OF A BENEFICE. See **BENEFICE.**
AVOIRDUPOIS, the name given to the common system of weights in England, now applied to all goods except the precious metals and medicines. Thus, a pound of tea is a pound *avoirdupois*, and contains 7000 grains; a pound of gold is a pound *troy*, and contains 5760 grains. The word is derived from the French *avoir du poids*, to have weight; and preserves, curiously enough, the true French spelling of *poids*, for the *d* is a late corruption from false analogy with Lat. *pondus*, a pound.

The ancient pound was heavier than the *avoirdupois*, and weighed 7600 grains. The earliest regulations on the subject fix the *troy* weight. The *avoirdupois* is mentioned in some orders of Henry VIII., A.D. 1532, and a pound of this sort was placed in the exchequer as a standard by Elizabeth, A.D. 1588.

The committee of 1816 made no alteration in the weights, but ascertained the value of the grain, as afterwards described in the Act of Parliament 5 Geo. IV. c. 74:—"A cubic inch of distilled water, weighed in air by brass weights, at the temperature of sixty-two degrees of Fahrenheit's thermometer, the barometer being at 30 inches, is equal to 252 grains, and four hundred and fifty-eight thousandth parts of a grain." The pound *avoirdupois* contains 7000 such grains, and the pound *troy*, 5760. From this it may be deduced that a cubic foot of water, under the above conditions, weighs 997.14 oz., which, being very nearly 1000 oz., gives an expeditious rule for deducing the real weight of a cubic foot of any substance from its specific gravity. For example, if the specific

gravity of gold be 19.36, the weight of a cubic foot of gold is 19,860 oz. *avoirdupois*. If more accuracy be required, subtract three for every 1000 from the result. *Avoirdupois* weight is in general use in the United States of America, but in New York and some other districts the hundred-weight contains only 100 lbs., and the ton 2000 lbs., instead of 112 and 2240 as in England. [See **WEIGHTS AND MEASURES.**]

A'VON, the name of several rivers in England. [See **WARWICKSHIRE**, **WILTSHIRE**, and **SOMERSETSHIRE.**] The word is of Celtic origin, and is the same as *afon* in Welsh, and *abhainn* (pronounced "avain") in Gaelic. It is from the same root as the Sanskrit *ap*, water, and the Latin *aqua* and *amnis*. The word appears, more or less disguised, in the names of an unusually large number of rivers all over Celtic Europe.

AVRANCHES, a city of France, in the department of Manche, stands on the south bank of the Sée, on the railway from Coutances to Dol. It is delightfully situated on the side of a hill, and the view from the public garden is one of the finest in Normandy. The river winds at the bottom of the hill, and falls into the sea 2 or 3 miles below the town. The valley of the river is covered with fine verdure, and with woods which reach quite down to the shore. But the most prominent feature of the view is the peaked rock of Mont St. Michel, and the twin islet of Tombelaine, rising from the waters of the Bay of Cauxale. Before the Revolution Avranches had a cathedral, three parish churches, and several monastic and educational establishments. The cathedral, built in the eleventh century, suffered greatly at the Revolution, and is now a heap of ruins. A flat stone marks the spot where Henry II. did penance, in 1172, for the murder of à Becket. A new Gothic cathedral, of granite, has been built on a wide space adjoining the public garden. Small vessels can get up the river as far as the bridge. Corn, butter, and cattle are among the articles of trade; a good deal of salt is made. There are a tribunal of first instance, a college, a museum, a library of 10,000 volumes and 200 manuscripts, and a botanic garden. Many English families settled here after the peace of 1814, attracted by the beauty of the situation, the salubrity of the air, and the cheapness of the living. A new English church was opened in 1882. Avranches formerly gave name to a district (*Avranchin*), which now forms the arrondissements of Avranches and Mortain. See **MANCHE**.

The town itself was the ancient *Abrincata* or *Ingena*, and was an important military station of the Romans. It was fortified by Charlemagne as a frontier defence against the Celts of Brittany, and under Lanfranc it became a great school of philosophy. In the wars between France and England in the fourteenth and fifteenth centuries, it was repeatedly taken by both sides. The population of Avranches in 1882 was 8000.

AWATSKA BAY is a capacious basin on the eastern coast of Kamtshatka, and the only good harbour in the whole peninsula. At the head of the bay is the town of PETROPAULOVSK.

The river Awatska, at its entrance to the bay, is nearly a quarter of a mile broad, but soon gets narrow. It is very rapid, especially at the season of the snow-melting, and is said to continue its course 100 miles in a N.W. direction, but is so shallow even at its mouth that it is only navigable for canoes.

AWK, LOCH. See **ARGYLESIRE.**

AWN or **ARISTA**, the beard of grasses, is a rigid bristle, often hairy and frequently twisted, proceeding from the back of some of the envelopes of the flower. It is often employed for systematic purposes, in consequence of the number of modifications to which it is subject. It appears to be one of the veins or ribs of the envelopes, unusually lengthened and separated from the cellular substance to

which it belongs. The word is also applied to any process in other plants which resembles the true awn.

AXE (rivers). See SOMERSETSHIRE, DEVONSHIRE.

AX'EL or **AB'SALON**, Archbishop of Lund, in Denmark, a distinguished statesman and general, was born at Finnestoe in the island of Zealand in 1128. He was descended from a distinguished family, and was related to King Waldemar I., by whom he was created bishop of Roskilde, and made a member of the king's council. He drove the Wendish pirates from the coast of Denmark, and after pursuing them into their strongholds, and burning the temple of their god Svantovit, he forced them to accept Christianity. He was appointed archbishop of Lund in 1178, and in the useful legislation of Waldemar and his son he took an important part. He defeated the Prince of Pomerania, Bogislav, and made him a dependent of Denmark; and further extended Danish authority over Mecklenburg and Esthonia. A fortified castle was built under his direction for a protection against the Baltic pirates, and this gave rise to the city of Copenhagen, sometimes termed on this account Axelstadt. The church in Denmark was also largely indebted to Axel, who reformed the rules of the monasteries. To his patronage of learning the world is indebted for the first connected history of Denmark, that by Saxo Grammaticus. He died in 1201, and was buried in the Church of Sorø, which he had built.

AX'HOLME, ISLE OF, an island in the county of Lincoln, formed by the rivers Trent, Idle, and Don. It is about 17 or 18 miles long from N. to S.; and, on the average, 5 or 6 miles broad from E. to W., except in the northern part, where it becomes narrower and ends in a point.

Dugdale ("History of Embanking and Draining") states that Axholme was once a well-wooded island, but that it became marshy ground by irruptions and overflowing of neighbouring rivers. In the reign of Edward III. commissioners were appointed to superintend the banking and draining of the marshes; but for three centuries afterwards little was done to bring the island into a profitable state.

In the reign of Charles I. however, the drainage of this level was attempted on a large scale. It had, together with Hatfield Chase, come into the hands of the king as feudal superior; and in the second year of his reign he employed a Dutch engineer, Cornelius Vermuyden, to drain the marshes at his own charge, on condition of receiving one-third of the land so recovered. In five years Vermuyden finished his work, at a cost of £55,825. By embankments and sluices he so drained the land as to make it productive for agricultural purposes. About 200 families, Dutch and French (of the French Protestants who had taken refuge in Holland), settled in the recovered lands. From the commencement of the proceedings, however, the original inhabitants looked with much jealousy at the foreigners; and continued opposition was manifested, first by lawsuits and then by personal encounters, throughout the remainder of Charles I.'s reign.

During the Protectorate the confusion in the island seems to have continued, and for half a century after the restoration of Charles II. a state of insubordination prevailed such as no other part of England at that time presented. A chancery decision, in 1719, settled a quarrel which had lasted fiercely for almost ninety years. By the decision the Dutch and French settlers were awarded 2868 acres, and the original residents 10,532. Few of the descendants of the Dutch settlers now remain at Axholme, but they were there long enough to affect the physical appearance and accent of the inhabitants even to the present day.

The island is specially interesting as the scene of the largest experiment in *la petite culture* in England. Of the 20,000 acres of upland a large proportion consists of open

field areas of 100 acres or more, each bounded by small farm inclosures. A field, sometimes a mile in length, is divided into narrow lands or stripes, all abutting upon a road, and stretching back in some cases for a quarter of a mile; and on these plots of all breadths, from 10 to 20 yards or much more, but frequently not exceeding a width of 5 or 6 yards, intermixed crops of different kinds grow side by side without any fence or gutter, or even a grass boundary between them. In the whole district only a few farms of from 200 to 400 acres are in existence, while about half the inclosed land is in farms of from 20 to 50 acres, and the remainder in holdings of less than 10 acres each. The plots are not only separate occupations, but to a great extent also distinct properties, and there are over 1400 freeholders in the island.

Axholme is in the west division of Manley Wapentake, and includes seven parishes, which contain 46,980 statute acres. There are two market towns, Crowle and Epworth.

AX'INITE. This mineral usually occurs crystallized in flat prismatic crystals, with very sharp edges, the fundamental form being a double oblique prism. Its colour is clove-brown, sometimes inclining to plum-blue; sometimes transparent, at other times only translucent on the edges; its lustre is vitreous. The specific gravity of a crystallized variety from Cornwall is stated by Mohs to be 3.271, and its hardness 6.5 to 7. Before the blowpipe it readily fuses into a dark glass. It is found in Cornwall, Saxony, Dauphiné, and Norway. In composition it is an anhydrous silicate of alumina, lime, and iron, with small proportions of boracic acid and manganese. A property of some minerals, called *trichroism*, is well illustrated in axinite; when looked at in one direction the colour appears to be a cinnamon-brown, in another direction a dark violet, and in another a pale olive.

AX'ION (from the Gr. *axioma*, that which is worthy, i.e. which needs no proof), a mathematical term signifying an assumption so self-evident that no demonstration could make it more clear. Euclid gives twelve such axioms, the first being, "Two things that are equal to the same thing are equal to each other;" and the others being similar. Upon these he bases the whole fabric of geometry. A fierce controversy has always raged around the twelfth axiom, and modern geometers are indeed agreed that as stated by Euclid it is not a true axiom. It runs thus—"If a straight line meets two other straight lines, so as to make the two interior angles on the same side of it, taken together, less than two right angles; these straight lines, being continually produced, shall at length meet upon that side on which are the angles, which are less than two right angles." This is by no means self-evident, for what is the definition of parallel straight lines given by Euclid himself? Simply the negative statement that such lines, though produced ever so far in either direction, do not meet. Besides, he cuts the ground away from himself by expressly demonstrating the converse of it in I., 17; and of course both an axiom and its converse should be alike self-evident. This latter objection is fatal to the often-suggested alternative definition—"If a straight line fall on two parallel straight lines the alternate angles are equal to one another," since the converse of this is also demonstrated in I., 27. Playfair adopts an altogether new conception—"Two straight lines which intersect one another cannot both be parallel to the same straight line." This follows as a direct inference from I., 30; but is hardly self-evident before that demonstration. Simson's amended axiom is certainly the best, and is in the form of a definition—"Parallel lines are such as lie in the same plane, and which neither recede from nor approach to each other." No less than thirty attempts to construct a faultless axiom on parallelism are recorded in Colonel Thompson's "Geometry without Axioms."

Indeed the whole question of axioms is doubtful; it is

generally thought now that experience is necessary for the perception of every truth, however simple, but that such truths as are above indicated are so perpetually before the mind from its earliest awakening, and also that the ability to perceive them is so firmly inherited with other characters of the race, that they have thus come to possess an apparently independent power. Besides axioms, geometry demands by the POSTULATES power to make certain constructions.

The Greek expression for axiom was "common notion." The term axiom is probably no older than the seventeenth century. It is used by analogy for the assumptions upon which any science is founded. Thus we have the "axioms of political economy," &c. The objection taken above holds, however, with redoubled force against these pseudo-axioms.

AXIS, AXE. This word is used in so many different senses that it may be defined as follows:—Any line whatsoever, which it is convenient to distinguish by a specific term, with respect to any motion or other phenomenon, is called the axis. Thus we have axes of co-ordinates, of oscillation, of inertia, of rotation, of polarization, &c. The word, when used by itself, generally means either *axis of rotation* or *axis of symmetry*. An axis of rotation or revolution is the line about which a body turns; an axis of symmetry is a line on both sides of which the parts of the body are disposed in the same manner, so that to whatever distance it extends in one direction from the axis, it extends as far in the direction exactly opposite. Or if perpendiculars to the axis be drawn from all points and in all directions through the body, the whole of each perpendicular which is within the limits of the body will be bisected by the axis. Such is the middle line of a cone, any diameter of a sphere, the line drawn through the middle of the opposite faces of a cube, &c. The axis of a curve, as of a parabola, ellipse, or hyperbola, is the line dividing it into two symmetrical parts. An ellipse has therefore two axes—the major axis, passing through the foci and the apses; and the minor axis, at right angles to this. The axes of a circle are called diameters, and are unlimited in number.

AXIS, in astronomy, means the imaginary line round which a body rotates. The axis passes through the imaginary points called poles. The axis of the earth is inclined $23\frac{1}{2}^\circ$ from the vertical, rotatively to the ecliptic or path of annual revolution round the sun, which inclination occasions the incessant variation in the length of day and night throughout the year, and also the regular recurrence of the seasons. Were the earth's axis vertical in space (vertical to the ecliptic, that is) we should have no seasons, and no inequality of day and night. This is almost the case with Jupiter, since its axis is only inclined 3° . Uranus, on the other hand, is inclined no less than 100° , so that nearly half of it has perpetual night and winter, whilst the other has perpetual day and summer. But as regards the last the distance of Uranus is so great that the influence of the sun's heat is enormously diminished from the power it has as we know it.

When a body turns on an axis, round which it is perfectly symmetrical, that line is called a *permanent axis*; for if no external force act on it, it will continue to rotate. Such permanent axes are the diameter of a sphere, the diagonal of a cube, &c. But further, if such a body be set rotating on its permanent axis, and the axis be pointed in any direction, the slope of the axis will not vary. The *Gyroscopic* is an instrument which has a heavy rim, capable of being spun like a top round its permanent axis; and if this axis be pointed to a star, and gravity be prevented from influencing it, it will continue pointing thither while the instrument rotates. If the earth were at rest the *gyroscope* would not change the position of its axis with respect to the earth also; but since the earth rotates the axis of the *gyroscope* steadily varies with regard to it. In

this ingenious way M. Foucault showed at once the cause of the permanency of the "tilt" of $23\frac{1}{2}^\circ$ which the earth has, and also proved that the earth and not the stars moved, since the axis of the *gyroscope* is invariable with regard to the stars, and varying with regard to the earth.

AXIS, in anatomy, has two meanings:—1. The second vertebra of the neck; that on which the *ATLAS* revolves. The latter carries the skull on its two lateral masses, specially articulating with the condyles of the skull, which therefore can rock to and fro, as in nodding. To gain the power of rotating the head (shaking the head) the atlas is provided with a deep inner indentation, and the axis with a peg to fit in it (the *odontoid* or tooth-like process), and the indentation is converted into a complete ring socket by the strong *transverse ligament* of the atlas; so that the atlas, carrying with it the skull, rotates round the odontoid peg of the axis. Further, the axis is itself provided with two strong bands of fibres, the *odontoid* or *check ligaments*, which, passing obliquely from the apex of the peg to the margin of the foramen of the skull on each side, prevent any excessive rotation; and in addition there is the *central odontoid process*, which passes vertically upwards between the front margin of the foramen magnum (the "great hole" of the skull) and the absolute tip of the peg, pulling the skull, the atlas, and the axis tightly together. Both atlas and axis will be found represented in our Plate *BACKBONE*.

2. A short central artery or centre trunk whence arteries diverge is called an *axis*. There are two very important arterial axes in the body. The first is a branch of the abdominal aorta, the *coeliac axis*, half an inch in length, which divides at once into the gastric, hepatic, and splenic arteries, supplying respectively the great vital organs, the stomach, liver, and spleen. The other is a branch of the subclavian artery of each side of the neck, and is called the *thyroid axis*, dividing almost at once into the inferior thyroid, transverse cervical, and supra-scapular arteries, supplying respectively the throat, neck, and shoulder-blade. There is but one *coeliac axis*, but there are of course two thyroid axes, one for each side of the neck.

AXIS, in botany, a term which is applied to the root and stem of the whole plant. The result of placing the seed of a plant in a place fitted for its growth is the development of the embryo. The plumule ascends into the air, whilst the radicle descends towards the earth. The former is said to be the *ascending axis* of the plant, the latter the *descending axis*. It is around these axes of growth that all other parts of the plant are arranged. Those which are found upon the ascending axis or stem are collectively termed the *appendages of the axis*, and individually constitute the scales, leaves, bracts, flowers, stamens, carpels, and modifications of those parts of the plant; all these parts are in connection with the vascular system of the axis, and must not be confounded with mere expansions of the epidermis, such as hairs, prickles, &c., which have no real connection with the axis. Sachs' definition ("Text-book of Botany") is very comprehensive—"By the term axial structure or axis is to be understood every member that continues to grow at its apex, and produces lateral members; for example, a mother-root with its lateral roots, a stem with its leaves, the mid-rib of a leaf with its leaflets; laciniae, or lobes; or a thallus-shoot with its lateral outgrowths."

If a plant, growing in a pot, is placed in a horizontal position, the mature parts will remain so, but the root will turn vertically downwards, the end of the stem upwards, and the leaves, branches, and secondary roots will bend until they make an angle with the horizon about equal to the one made before the change. There are two proofs that these various directions are due to gravitation. First, plants at the antipodes and elsewhere on the surface of the earth grow in the same position with regard to the centre of the earth; and the attraction of the mass of the earth

is the only force which stands in a perfectly definite relation to the position of the earth's centre of gravity. Secondly, gravitation acts independently of the chemical and other properties of a body, and in this respect centrifugal force resembles it. Knight was the first to show, in 1806, the directions of growth induced by centrifugal force. If a growing seedling is fixed upon a rotating disc, so that the direction of the axis is at a tangent, the mature parts maintain this direction, while the root grows outwards in the direction of the centrifugal force, and the apex of the stem grows in the opposite direction towards the centre of the disc. Gravitation acts in addition to the centrifugal force; and if the rotation takes place in a horizontal plane the stem and root become oblique, unless the rotation is very rapid, when the direction of growth remains nearly horizontal. If, on the other hand, the seedlings are placed on a disc rotating in a vertical plane gravitation affects all sides equally, and the root and stem take respectively an outward and an inward radial direction. Sachs, however, has shown that if the disc is made to turn very slowly in a vertical plane, so that there is in fact no centrifugal force, the organs then grow neither in the direction of gravitation nor in that of the centrifugal force, but in those directions in which they had happened to be placed when fixed on the disc. This action of the attraction of the mass of the earth has been styled *geotropism*.

AX'IS (*Cervus axis*) is a deer, native of northern India, but breeding freely in Europe. It is found abundantly in the jungles on the borders of the Ganges in herds of fifteen or twenty. The hair is of a fawn colour, beautifully spotted, passing into dark brown on the back; the under parts are white. This animal has a general resemblance to the fallow deer, but differs in the antlers, the long beam of which forks into two tyres. The females are hornless. The axis stands about 2½ feet high at the shoulders. So well does the hair of this deer simulate the general colour of its surroundings that even the practised eye of the sportsman is often deceived. See DEER.

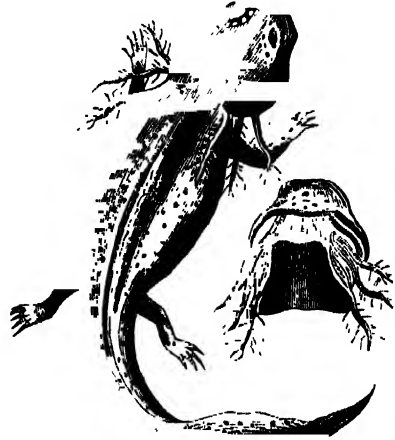
AX'US, a river of Macedonia, now called Vardar, which flows into the Gulf of Salonica. The alluvial depositions have encroached greatly on the gulf, leaving a low and swampy land, intersected with numerous small streams, which form islets of high reeds, and render the principal branch difficult to discover. The entrance is obstructed by shoals and sandbanks, but the river is navigable for boats of 25 to 30 tons for several miles. It runs about N. by W. nearly a straight course for 8 miles, when it is joined from the E. by a small stream not navigable for boats (possibly the ancient *Echeidorus*); then taking a more westerly direction it becomes more tortuous. The depth of the river depends on the season of the year.

AX'MINSTER, a market town in Devonshire, situated near the eastern boundary of the county, 26 miles E. from Exeter, and 144½ from London by the South-western Railway, on the south-eastern bank of the river Axe. The streets are wide and clean. The church is ancient, and heavy in appearance, with a Norman doorway. The town is chiefly agricultural, and "Axminster" carpets are now made at Wilton. The population in 1881 was 2872.

AX'OLOTL (Siredon) is a remarkable animal belonging to the order URODELA, and class AMPHIBIA. It has three long gills on each side of the head, a ridge running along the back, a compressed keeled tail, and a broad flat head. The teeth are arranged at the sides of both jaws; and in addition to these, there are very small teeth placed in several rows. It has four short legs, the fore limbs being furnished with four toes, the hinder with five; the toes are furnished with skin-like appendages. It attains a length of 8 or 10 inches. The general colour is deep grayish-brown, thickly mottled with round black spots. There is a slimy secretion of the skin, provided for by special glands. The axolotl is very common in the Lake

of Mexico, and is found also in mountain lakes at a considerable elevation above the plains surrounding the city. It is commonly sold in the markets of Mexico, and is esteemed a luxury by the inhabitants.

The axolotl was long regarded as one of those genera of the Urodela which, like the *SIREN*, retain gills throughout their whole existence, and are therefore called "perenni-



The Axolotl.

branchiate." The observations of Duméril and others, however, show that under certain conditions this animal loses its gills and undergoes other changes, becoming identical in form with the amblystoma, an animal nearly allied to the SALAMANDER, and belonging to the other division of the Urodela—the "caducei-branchiate." There are twenty species of amblystoma inhabiting North America. The differences between this form and the axolotl are very striking; not only do the gills disappear, but the gill-clefts close up, and all the branchial arches except the foremost disappear. The ridge along the back is lost. The flat tail, fitted for life in water, becomes much more like that of the salamander. The very small teeth are shed, and those arranged along the sides of the jaws take up a transverse direction. The toes become narrowed, and lose their appendages. The glands in the skin no longer secrete. The eyes become prominent with narrow pupils, and eye-lids are formed capable of covering the eyes. By the direction of Weismann, to whose account in his "Studies in the Theory of Descent" (1882) we are indebted for much information for this article, experiments were made by Fräulein von Chauvin to examine under what conditions the axolotl larvæ change into the amblystoma form. This very difficult undertaking was completely successful, and showed that the change takes place when, at the age of from six to nine months, they are placed in such shallow water that they are compelled to respire chiefly by their lungs.

When Duméril's original observations were published, they created an extraordinary sensation. Had we here an instance of the creation of a species, a "sudden advance in the phyletic development of the species occurring at one stroke?" This change of form has ever since been a great puzzle. It appeared to strike a rude blow at the theory of "adaptation" or development by "natural selection"—the "gradual bodily transformation appearing in the course of generations in correspondence with the new requirements of altered conditions of life." The case appeared to be an instance of a development which can only be ascribed to a "phyletic vital force," since there is no time for adaptation, and the direct action of the changed conditions of life by no means furnishes an explanation of the

complete transformation of the whole structure. Weismann puts forward another interpretation, which is doubtless the correct one; he believes that "the axolotls which now inhabit the Mexican lakes were amblystomas at a former geological epoch; but that owing to changes in their conditions of life, they have reverted to the earlier perenni-branchiate stage." This position is sustained by various considerations. Wiedersheim has shown that the axolotl possesses an intermaxillary gland. Now, this gland only occurs elsewhere in the forms which live on land. It therefore originated with this form, and became transferred secondarily to the larval stage. In the aquatic axolotl, in which it is of no use, it appears as a remnant of a structure only useful to an ancestor which lived on the land. Besides, reversion is a fact in nature, and analogous cases are known of Tritons reverting to the perenni-branchiate stage. Again, the amblystomas developed from axolotls are almost always sterile. If this had been a *new form* called forth by the action of a phyletic vital force, we cannot but think that it would have been fertile.

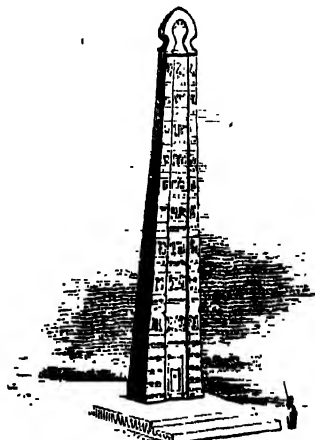
With regard to the change in the conditions of life which led to the reversion, Weismann points out that the atmosphere in Mexico at the present day is so dry that amblystomas could scarcely exist on land; and though in the Lake of Santa Isabel, some hours' journey from the city of Mexico, there exists a species of axolotl (*Siredon tigrinus*) which does change into amblystoma, yet these are found to bury themselves during the drought of summer. This lake dries up periodically, so that *Siredon tigrinus* had not the chance of reverting to the water form like *Siredon mericanus*, which inhabits a deep lake.

That land-salamanders were at one time possible around the city of Mexico is shown from observations made on the spot by Humboldt. "All such elevated plains were certainly at a former period so many extensive water-basins, which gradually became filled, and are still filling up with detritus. The evaporation from such large surfaces of water must at that time have caused a very moist atmosphere, favourable to vegetation and adapted for the life of naked Amphibia." Forests also formerly extended all over the Mexican plateau; so that we have here conditions favourable for the development of a salamander form from one like the axolotl.

AXUM (the ancient *Axumme*), a town of Abyssinia, about 120 miles S. from Atkeeko, which is on the coast of the Red Sea. The present town consists of only about 600 houses; it stands "partly in and partly at the mouth of a nook formed by two hills on the N.W. end of an extensive and fertile valley, which is watered by a small stream." One of the objects which first strikes a traveller is a small plain obelisk, with the remains of many others lying near it; but the great curiosity is the large obelisk, 60 feet high, made of a single block of granite. The engravings on this obelisk are not hieroglyphics like those of Egypt, nor does it exactly agree with them in shape. Though it is a quadrilateral, one of the sides has a hollow space running up the centre from the base to the summit, which, instead of terminating in a pyramid like the regular obelisks, is crowned with a kind of patera. At the bottom of the hollow space just described a doorway is represented. The obelisks of Axum were originally fifty-five in number, and four of them, it is said, were as large as that now standing. Among the other antiquities of Axum is a stone which contains two inscriptions—that on one side is in rude Greek characters, and that on the opposite in the Ethiopian language; the latter is generally supposed to have been cut at the same time as the Greek inscription.

Besides the obelisk there is a Christian church at Axum, which dates only from 1637, in which the history of Abyssinia, known under the name of the "Chronicles of Axum," is kept and continued. A copy of the "Chronicles" was brought to Europe by Bruce.

The Ethiopian kingdom of the Axumites is first noticed by the author of the "Periplus" (or "Coast Survey") of the Red Sea and part of the east coast of Africa, &c. This document, which is still extant, was written probably about the close of the second century; but how long this Axumite kingdom had existed before it is impossible to say. Through the port of Adule on the Red Sea, Axum maintained a commercial intercourse with Arabia and India; and



Obelisk of Axum.

it was probably for some advantage to be secured to Greek merchants from Egypt in the Indian trade that the Byzantine Caesars paid a yearly tax to the Axumite king until the commencement of the Arab conquest. Axum was the great emporium for ivory, which was exported through Adule. In the sixth century Axum interfered on behalf of the Arabian Christians, and thus incurred the enmity of the Arabs, which ultimately resulted in its downfall. It is, however, still a holy city for Abyssinian Christians.

AYACUCHO, the capital of a department of the same name in Peru, is situated in a plain, which was the scene of a decisive battle in the war of independence, fought in 1824 between the Spaniards and the Columbian and Peruvian allies, wherein the Spaniards were defeated with great loss, and the viceroy, fifteen general officers, and 3200 men were compelled to surrender. The battle ended the Spanish rule on the American continent. The town has more than twenty churches and a good trade. The population is nearly 30,000.

AYAMONTE, a town in Spain, in the province of Huelva. It is situated on the slope of a lofty hill, on the eastern side of the mouth of the Guadiana. It is a fortified town, and stands opposite to Castromarin, in Portugal. Its population is about 6500, three-fourths of whom are fishermen and sailors, and the remainder are employed in agriculture and commerce. Soap, earthenware, brick, and lime are made; but the inhabitants are chiefly engaged in the tunny and anchovy fishery. The castle is very ancient.

AYE-AYE (*Cheironys Madagascariensis*) is a very singular animal, now generally placed among the LEMURS, and found only in Madagascar.

It is nocturnal in its habits, dwelling in the most impenetrable and gloomy parts of bamboo forests. Here the aye-aye sleeps all day covered with its long bushy tail, and coiled up in a large nest placed at the fork of the branches of a tree. This nest is formed of the rolled-up leaves of the "traveller's tree" (*Ravenala*), and is lined with small twigs and leaves. When night falls it leaves this snug abode and commences a search for its favourite food, the grubs of beetles and other insects. It springs from bough

to bough, ever and again stopping at a likely branch, laying its large, open, spoon-shaped ears close to the bark, and tapping it with its curious middle finger, which is so slender that it seems to be shrunken and paralyzed. Aided both by its delicate hearing and its acute sense of smell, it speedily discovers the hiding-place of the grub. With its strong front teeth (incisors), which, like the rest of its teeth, resemble those of a rabbit, it strips off the bark and picks out the fat grub with its middle finger. Living as it does constantly in trees, the only water available is that caught in the deep clefts and hollows in the branches; and this it contrives to make use of in a very remarkable way, by dipping a finger into the water, and drawing it with great rapidity obliquely through its mouth. Besides grubs it feeds on the pith of bamboos, sugar-canes, and other vegetable food.

When adult the aye-aye measures about 18 inches in length, and its tail almost as much more. It is clothed with a thick fur, composed of two kinds of hair—a thick woolly down close to the skin, and longer smooth hairs, which form the outer coat. The general colour of the fur is a pale rusty brown, with the face and throat lighter. The thumb is only slightly opposable.

This little animal is regarded with superstitious awe by the natives of Madagascar. It is never hunted, and when accidentally caught in a lemur-trap, it is smeared with fat and immediately set free by the trembling owner of the trap. The aye-aye, it is believed, brings a pillow for anyone sleeping in the forest; if the pillow be for the head, the sleeper will gain honour and riches; if for the feet, he has incurred the animal's wrath, and harm will happen to him.

AYESHAN, the favourite wife of Mohammed, the daughter of Abdullah, was born in 610 or 611 A.D. As she was the only virgin wife of the prophet, to whom she was married when she was but nine years old, her father's name was changed to Abu-Bekr ("the father of the virgin"). Mohammed loved her deeply although she bore him no children, and during his last illness he was carried at his own request to her house, where he died in her arms. On one occasion she was accused of adultery; but Mohammed declared that he had received a revelation from heaven declaring her innocence, which is now contained in the twenty-fourth chapter of the Koran. He punished her accusers, and threatened all who should doubt her purity with the pains of hell for ever. She took an active part in the intrigues which followed the death of Mohammed; and after the assassination of Othman she headed a force to resist the accession of Ali. Successful at first, she was ultimately defeated and taken prisoner. Ali, however, dismissed her with permission to live in any town in Arabia, provided that she did not interfere in the affairs of state. She was highly venerated by the followers of Mohammed, who gave her the titles of Prophetess and Mother of Believers, and her interpretations of the doubtful passages of the Koran were regarded as authoritative. She died at Medina in the fifty-eighth year of the Hegira (677 A.D.), at the age of sixty-seven.

AYLESBURY, a borough and market town in Buckinghamshire, 38 miles from London by road, through Watford, Berkhamstead, and Tring, and 43½ miles by the North-western Railway.

The town is situated near the centre of the county, on a small elevation in the midst of the fertile valley of Aylesbury. It is close to a small rivulet which comes from the neighbourhood of Wendover, and which, after passing Aylesbury, falls into the Thame about 2 miles north-west of the town. Aylesbury consists of several streets and lanes irregularly built. The elevation of the town above the general level of the vale caused the want of water to be frequently felt by the inhabitants; but the houses are now well supplied by means of machinery.

The county hall is a handsome brick building erected in the earlier part of the last century. Adjoining it is the corn exchange, with covered meat, poultry, and vegetable markets in the rear, opened in 1865. A new county infirmary was completed in 1862, at a cost of £8000. It has a handsome façade 220 feet in length, and it is exceedingly well arranged for the health and comfort of the patients. The parish church, dedicated to St. Mary, is a spacious structure, with a low tower rising from the intersection of the nave and transepts. It was carefully and very thoroughly restored under the superintendence of Sir G. G. Scott in 1867, and several painted windows have been inserted. There are places of worship for Independents, Baptists, Quakers, and Methodists. There are also a good endowed school and several charities. The only manufactures of the town are lace and straw plait, and it depends chiefly on its position in the centre of a busy and prosperous agricultural district. There are two large breweries and steam and water flour-mills. Many ducks are reared in the vicinity for the London market at an early season of the year, and fetch high prices. The population of the parish (which includes Walton) in 1881 was 7795; of the parliamentary borough, which, previous to 1881, returned two members, 28,899.

Aylesbury is a very ancient town, and is said to have been one of the strongholds of the Britons in their struggle against the Saxons, who took it in 571. The Saxons called it Aeglesburg. In "Doomsday Book" it appears under the name of Elesberie. In Leland it is written Alesbury, and in Camden Ailesbury.

AYLESFORD (*Eglwys-ford*, or "Church-ford"), a village in Kent, situated on the east bank of the Medway, 3½ miles from Maidstone, and 39 miles from London by the South-eastern Railway. There is an ancient church with a square west tower. Close to the Medway, a short distance west from Aylesford, stood a Carmelite friary, founded in 1240, and said to have been the earliest foundation for Carmelites in the kingdom, which was suppressed at the Reformation. Many portions of the conventual buildings are incorporated in the present mansion of the Earl of Aylesford. On the side of the hill, about 1½ mile E.N.E. from Aylesford, is Kit's Coty House, one of those Druidical monuments called cromlechs. [See CROMLECH.] This cromlech is supposed to mark the burial-place of Catigern, who was killed in battle between the Britons and Saxons in 455. The peculiar name is derived from the Celtic *Kêd*, *Coity*, or *Coed* (Welsh), and means the tomb in the wood. The tomb of Horsa, who fell in the same battle, is situated at Horsted, about 2 miles to the N. The population of the parish in 1881 was 2100.

AYL'SHAM, a market town in Norfolk, 12 miles N. by W. from Norwich, is situated on the right bank of the river Bure. The church, which is ascribed to John of Gaunt, contains some monumental brasses, and a richly carved font. The principal trade is in corn. There are several good schools and charities. Population of the parish, 2500.

AYMON (the four sons of). See HAYMON.

AYR, the county town of Ayrshire, Scotland, and a seaport on the Frith of Clyde, 40 miles S.W. of Glasgow by rail and 34 by road. The town stands at the mouth of the river Ayr. It is situated on low ground, and surrounded by gently rising heights, which form a great natural amphitheatre. It commands magnificent views of the Frith of Clyde. It is a royal burgh, and also a parliamentary burgh included in the Ayr district of burghs. The population of the parliamentary burgh, which includes Newton and Wallacetown, was 20,812 in 1881, as compared with 17,853 in 1871. The number of electors in 1884 was 2400. Two bridges, the old and the new (the "Two Brigs" of Burns' famous poem), connect Ayr with the north side of the river. The county buildings, in Wellington Square (which is one of the finest squares in any

provincial town in Scotland), form a massive structure, built in imitation of an ancient temple of Isis at Rome; they consist of courts of law, and offices connected with them. The town buildings, which include a handsome town-hall, with stained-glass windows, and a new police court, were considerably enlarged and improved in 1881. A very handsome statue of General Neill, a native, who fell during the rebellion in India, stands at the upper end of the square; and in a line with it is one of the Earl of Eglinton, who died in 1861. It is of bronze, 12 feet high, and stands on a pedestal of granite 16 feet high. The Wallace Tower, on the site of an old building of the same name which was pulled down to make room for it, is 115 feet high, and a conspicuous ornament to the town, as is also the spire of the Assembly Rooms, 226 feet in height. The Old Church, erected during the protectorate of Cromwell, is a very solid and venerable-looking structure. There are also Free Church, United Presbyterian, Episcopalian, and Roman Catholic, &c., places of worship. About 3 miles from Ayr, on the east bank of the river Doon, near Alloway Kirk, is Burns' Monument. It is an architectural structure of great beauty, having nine Corinthian columns on a massive rustic base, and being surmounted by a gilt tripod. The cottage in which Burns was born is in the immediate neighbourhood. An excellent race-course, on which races take place annually, occupies a fine situation about a mile from the town.

The harbour has two piers, which extend into the sea upwards of 800 yards. It has been much improved and deepened of late years, and now admits vessels drawing 14 feet of water. A wet dock and slip were built in 1881. The number of vessels registered as belonging to the port in 1885 was fifty (14,600 tons). The entries and clearances each average 2500 (260,000 tons) per annum. The customs is about £1400 per annum. Hemp, mats, tallow, tar, pitch, and timber are the chief imports; coals, iron, cordage, leather, and woollen goods the principal exports. About 200,000 tons of coals are shipped per annum. There are manufactures of woollens, flowered muslins, and carpets. Shoemaking is extensively carried on, and there are also a foundry and some tan-works.

Ayr is one of the towns at which the high court of judicature for the southern circuit (corresponding to the English assizes) is held. It is also the seat of a sheriff court, small-debt court, commissary court, burgh criminal court, and justice-of-peace court. It is the place of residence of persons in easy circumstances, professional men, and tradesmen; and the business of the town arises chiefly from the number of gentry who inhabit it, and from its rank as a county town. The streets are well built, clean, and handsome. Between the town and the race-ground are numerous large and handsome villas. It is connected with Glasgow by railway.

Nothing definite is known of the history of Ayr until the close of the thirteenth century, when it was made a royal residence, and soon afterwards a royal burgh by William the Lion. Early in the sixteenth century it had become a place of great influence and trade.

AYRSHIRE, a county in the S.W. part of Scotland. The Frith of Clyde, an arm of the sea which washes it on the W. side, forms a bay, near the bottom of which is the town of Ayr. The coast line is above 66 miles in length. The inland boundary, from the northern point of the coast line, runs about 41 miles in an irregular line towards the S.E., and separates Ayrshire from Renfrewshire and Lanarkshire. After it reaches the most eastern point it turns to the S.W., and with many windings reaches the southern point of the coast, separating Ayrshire from the shires of Dumfries, Kirkcubright, and Wigton. The total area of the county is about 1128 square miles, or 722,220 acres.

The southern and eastern parts are the most hilly. Along the shores of the Frith are narrow plains abounding with gravel; the country inland rises into hills, which inclose as

within an amphitheatre the best part of the country. The principal hills are Knockdolian, Cairn table, Blackside End, Carleton Hill, Knockdaw, and Knocknoman. Ailsa Craig, situated off the coast, is the summit of a submarine mountain about 2 miles in circumference, formed of primary rocks, and partly covered with verdure.

Ayrshire is a natural basin. Many streams rise near the inland boundary, and flow through the country into the sea, but the shortness of their course prevents them from becoming of much importance in a commercial point of view. The Garnock, rising in the north, and pursuing a course towards the south, unites with the Irvine, which comes from the east, or rather both these rivers fall into Irvine harbour. The Irvine, which is the largest of the two, is about 20 miles long. The Ayr crosses the country at its widest part, flows from east to west, and falls into the sea near the town of Ayr. It has a course of from 30 to 35 miles. The Lugar is its principal tributary. The Doon rises from several small lochs on the S.E. border of the county, and passing through Loch Doon, flows N.W. till it falls into the sea not far from the mouth of the Ayr. It is of about the same length as that river. The Girvan and the Stinchar rise in the same district as the Doon, and drain the southern parts of the county. They are about 20 to 25 miles long. The Nith, which flows through Dumfriesshire, and the Cree, which divides Kirkcubrightshire from Wigtonshire, rise in Ayrshire or on the border. In addition to the rivers, there are several small lochs, some of which abound in fish.

The mineral riches of the county are considerable. Coal and iron are abundant, especially in the middle and northern parts, which may be considered as included in the great coal-field of Scotland. The coal is of different varieties; among them is the bleude coal, found in the earth charred or redned to the state of a cinder. It burns without smoke or much flame, and is used for drying grain and malt. Considerable quantities are exported to Ireland and to the Western Isles. The county also contains abundance of stone, such as freestone, whinstone, pudding-stone, granite for millstones, blackstone for ovens, whetstones and marl. At Lugar, Kilwinning, Dalry, Killmarie, Muirkirk, Dalmeilington, and Ardeer extensive iron-works are carried on. Lead, plumbago or black-lead, antimony, and copper (of each of which the quantity is small) may be considered as completing the list of the minerals of Ayrshire.

The county south of the Girvan consists chiefly of Lower Silurian strata, and on the north the Old Red Sandstone occurs in several places. The superficial soil of the county may be classed generally as clay, sand or light soil, and nearly 300,000 acres of moss and moorland.

The light or sandy soil is met with along the coast, interspersed with a deep and fertile loam. On the eastern boundary the moorlands, intersected with mosses, occur. Of these mosses Aird's Moss and Moss-Mulloch, which last is partly in Lanark and Renfrew shires, may be noticed for their extent. The clay soil, which constitutes so large a portion of the land, varies in its character; it is in some parts strong and productive, while in others it is spongy, wet, and cold, producing grass unfit for fattening cattle, but sufficient for keeping breeding stock.

In recent years great improvements have been made in the agriculture of the county. Oats are the principal crop, but much wheat is raised, and potatoes are largely grown on the light soils along the coast. Carrots and mangolds are grown more extensively than in any other Scotch county. According to the official agricultural statistics published in 1885 there were 320,000 acres, or about three-sevenths of the entire area, under cultivation. The chief crops were—oats, 52,000 acres; clover and other grasses under rotation, 97,000 acres; and permanent pasture, 141,000 acres. The number of cattle in the county at the same time was 88,000 and of sheep, 350,000.

In stock-breeding the county occupies the second place in Scotland—being only surpassed by Aberdeenshire. The cattle in the southern part are chiefly reared for the market, and are for the most part of the Galloway breed. They are commonly black or brindled (though some are white or dun), and the best are without horns. They are very hardy, and grow fat where the large heavy breed of some other counties would be starved. Great numbers are yearly sent to England. The cattle in the northern part of the county are partly of the Dunlop breed, which has been established there for a century and a half. They are remarkable for the quantity and excellence of their milk. Besides these, there is a breed of brown and white mottled cattle, which is considered to have been introduced at a considerably later period. They are, like the others, excellent milkers. The dairy is an object of great attention in Ayrshire, and a considerable quantity of cheese is made. The Dunlop cheese is in good repute, and the making of it forms almost the sole business of the farmers in that parish. Through the exertions of the Ayrshire Agricultural Association the Cheddar mode of making cheese was introduced in 1856, and has become very general in several districts. The Alderney, the Irish, the small Highland, the Holderness, and some other breeds of cattle, have been partially introduced. On the dry lands along the coast a small white-faced breed of sheep has long been maintained. They produce but little wool, and that of middling quality, and seem to have very little to recommend them. The native sheep are bred extensively on the moors. They are among the hardiest, most active, and most restless of the sheep tribe. They are round, firm, and well-shaped, with black faces and horns. The wool is scanty in quantity and coarse in texture, but the flesh at five years old is excellent. The county possesses hardy and strong work horses. Swine are reared in small numbers. Rabbits are more numerous than in any other county in Scotland, but have greatly diminished with the progress of agriculture, especially since the shore lands were brought under cultivation. The lower parts of the county and the banks of its numerous rivers are thickly studded with plantations around the mansions of the proprietors. It is to be regretted that in the early period of improvement the Scotch fir was preferred to the larch. Plantations of willows for hoops and baskets have been made with considerable benefit. There is a reed near the lakes, in some parts of the county, which is excellent for thatching.

The climate of Ayrshire is moist, but far from unhealthy. The westerly winds blow severely on the coast; and the part near the Isle of Arran is subject to frequent and heavy showers, the clouds being attracted by the lofty mountains of that island. The air is milder and more temperate than in the east of Scotland; and towards the western or coast side it is pure and free from fogs. Snows melt as they fall on the coast.

The manufactures of Ayrshire are important, for the district possesses considerable advantages. Fuel is abundant, materials for building are at hand, there are channels of communication open, and the vicinity of Glasgow and Paisley has given a great impulse to improvement. The woollen manufacture has been long established, and bonnets and serges were early made at Stewarton and Kilmarnock. Improved machinery soon came in, and carpets, cloths (except the finer broadcloths), and stockings were made by it in the latter town. Towards the end of the last century the woollen manufacture extended to other parts of the county, and is carried on to a considerable extent by the aid of machinery. Dyers and fullers have established themselves in connection with this manufacture. Cotton works were erected at the village of Catrine on the Ayr, and the manufacture of that article is considerable at other places in the county. There are numerous tanneries, and the leather is employed in making shoes, boots, and

saddlery. Kelp, soda, and salt have all been made to advantage along the shore. Neither brick nor tile is much used in this county in building, the numerous quarries supplying plenty of stone. Bricks and tiles are, however, extensively manufactured, and shipped from the county ports. There are several iron-works and collieries, which employ several thousand persons. There are also extensive engineering establishments at Kilmarnock and Ayr, and chemical works at Irvine.

The county of Ayr contains the three ancient districts of Carrick, Kyle, and Cunningham. Carrick includes the country to the south of the river Doon; Kyle, the country between the Doon and the Irvine (which is again subdivided into King's Kyle, south of the Ayr, and Kyle-Stewart, north of that river); and Cunningham, the district north of the Irvine. These divisions are marked in many maps, and are used in speaking of the county, but they have had no distinct legal existence since the Act abolishing hereditary jurisdictions. The population of Ayrshire in 1881 was 217,519, as compared with 200,809 in 1871. The county formerly returned only one representative to the House of Commons, but another was allotted to it by the Reform Act of 1868, and the county was divided, for parliamentary purposes, into North and South Ayr, each of which returns a member. The number of voters in 1883 was 7800.

There are in Ayrshire several monuments of antiquity, including two cairns of gray stones of large diameter at Sorn and Galston; several oval and circular encampments; the ruins of Loch Doon Castle, Turnberry Castle, and more than a dozen others in different parts of the county; the ruins of Crossraguel Abbey, of Kilwinning Abbey, of the old collegiate church at Maybole, and of Alloway Kirk, immortalized in Burns' "Tam o' Shanter."

Ayrshire was inhabited at the time of the Roman invasion under Agricola by the great tribe of the Damnii. At a later period the descendants of the Scots, who came over from Ireland to the peninsula of Kintyre, and crossed from thence into Ayrshire, were mingled with the Damnii. In the eighth century Kyle fell into the hands of the Saxon kings of Northumberland. In the ninth century an attempt made by Alpin, king of the Scots-Irish in Kintyre, to subjugate the district failed, and the invader was defeated and killed. The people of Ayrshire at that time spoke the Gaelic language, and their county formed part of Galloway. The twelfth century was marked by the introduction of colonists from England, with new principles, customs, and jurisprudence; but the change was very gradual, and even at the end of the sixteenth century the Gaelic language was still spoken in Ayrshire. In the middle of the thirteenth century the Norwegians invaded this part of Scotland, but in 1263 they were defeated and driven to their ships by the King of Scotland, Alexander II. The decisive battle took place at Largs, in Cunningham. The earldom of Carrick came soon after, by marriage, into the family of the Bruces, lords of Annandale; and on the accession of Robert Bruce to the throne was merged in the crown.

In the religious troubles which occurred in the time of the latter Stuarts (Charles II. and James II.), the men in Ayrshire supported the Covenant with much zeal, and suffered severely for their steady adherence to the cause which they had embraced. Many were put to death, and the Highland clans were brought in to live at free quarters among them. They consequently rejoiced in the revolution of 1688, which overthrew the power of their persecutors. In the moors, mosses, and fastnesses of Ayrshire are several monuments to the memory of those who fell in the troubles, and especially of the field-preacher Richard Cameron and some of his associates, who were killed after a skirmish with a party of the military in Charles II.'s time. The character of the people at the present day indicates their descent from the zealous Presbyterians. They are remarkable for their regard for religion, their decency, and good conduct.

Burns' "Cottar's Saturday Night" may be regarded as descriptive of the manners of many of those in humble life. Their religious fervour has led them, however, in some instances, into irregularities and errors, as was shown by the rise of the false prophetess, Mrs. Buchan, towards the close of the last century. In the towns and villages there are many dissenters from the Kirk, and also throughout the county many adherents of the Free Church.

The island of Little Cumbrae, about a mile in length and half a mile in breadth, belongs to Ayrshire. The loftiest eminence in this island is 780 feet high. The whole island belongs to the Earl of Eglinton. There is a lighthouse upon it.

AYTON, SIR ROBERT, a Scottish poet of the Elizabethan era, born in 1570, equally skilled in Greek, Latin, French, and English. He was a member of the household of James I., and was of sufficient importance for Ben Jonson to have made it a boast that Sir Robert Ayton loved him dearly. He died at Whitehall Palace in 1638. Dr. Charles Rogers published his works from MS. (Edinburgh, 1841).

AYTON, WILLIAM EDMONDSTONE, Professor of Rhetoric in the University of Edinburgh, was a writer of considerable humour, and, like most humorists, of deep poetic feeling. He was born at Edinburgh 21st June, 1813, and studied at the university of his native city, in London, and in Germany. He was admitted a writer to the signet in 1835, and in 1840 was called to the Scottish bar. He was appointed to his professorship in 1845. His first wife was the youngest daughter of Professor John Wilson (the celebrated "Christopher North" of *Blackwood's Magazine*). He died at Blackhills, near Elgin, 4th August, 1865, and was buried at Edinburgh.

His first attempt in literature was a volume of poetry published in 1832. In 1836 he became connected with *Blackwood's Magazine*, and he remained a frequent and brilliant contributor until his death. In 1849 he published the work entitled "Lays of the Scottish Cavaliers," which established his reputation as a poet, and on which his fame chiefly rests. This has already passed through nineteen editions. He was the joint-author with Mr. Theodore Martin of the "Bon Gaultier Ballads" (1854), and a volume of translations of some of the minor poems of Goethe (1859). He also published, in 1854, a satirical poem entitled "Firmilian, a spasmodic tragedy;" in 1856, "Bothwell," a narrative poem after the style of Sir Walter Scott; and "Ballads of Scotland" (two vols. Edinburgh) in 1858.

His prose writings, of which the best known are "The Glenmutchkin Railway" and "How I became a Yeoman," are marked by a broad and robust humour. His university lectures also were very successful, the class increasing under his professorship from 30 to 150. (See "Memoir of W. E. Ayton," by Theodore Martin, Edinburgh, 1867.)

AYUNTAMIENTO, JUSTICIA, CONCEJO, CABILDO, REGIMENTO, are the names given in Spain to the councils of the towns and villages. The origin of this institution may be traced to the remotest period of Spanish history. It existed in the peninsula under the Romans; and under the Goths it was called the Council of the Prepositus or Villicus, a political and military governor appointed by the king. The individuals who formed the council were called priores or seniores. In the eleventh and twelfth centuries, the territories which the cruel and devastating wars between the Christians and the Moors had deprived of inhabitants, were again peopled, and the kings of Leon and Castile granted particular *fueros*, or charters, by which many great privileges were bestowed on such as chose to settle in these new colonies. Among these privileges was the re-establishment of the *concejos*, or communes. The members of the *ayuntamiento* were chosen by ballot by the inhabitants of the commune.

All the citizens enjoyed equal rights in these *concejos*; Christians, Moors, and Jews all had the same privileges. No nobleman was allowed to settle in them, unless he first renounced all the privileges of his class and became a commoner; but such were the immunities enjoyed by these colonies, and their consequent state of prosperity, that many barons voluntarily renounced the privileges of their rank to settle in them.

During the disturbed minorities of Ferdinand IV. and Alfonso IX. of Castile, the municipal constitutions of Spain suffered greatly. The kings and the feudal lords availed themselves of the pretext of disturbances in the elections of the *ayuntamientos*, and the king usurped the right of appointing their members in some *concejos*. Corregidores were appointed also, who usurped the judicial power formerly enjoyed by the *ayuntamientos*, who repeatedly appealed against this and other encroachments. Other limitations were, however, gradually introduced by the government, and under the Bourbons the last remains of municipal independence disappeared. Yet the people, who still retained the memory of their former liberty, at the Cortes of Cadiz in 1812 abolished these abuses, and all the towns were restored to their primitive right of electing their municipal officers. Ferdinand XII., on his return, rescinded everything which the Cortes had done. The popular *ayuntamientos* were again restored in 1823, and again set aside after the invasion by France. Finally, the arrangements made in 1812 were re-established by the constitution of 1837. The *ayuntamiento*, with the alcalde as president, was to be freely appointed by the people, and to have full control over municipal affairs, to organize the national guard, command the police, and manage the raising of the taxes and the disposal of the funds of the commune. In 1840 an Act was proposed to deprive the *ayuntamientos* of all political power, restricting them to purely municipal affairs; but it caused an insurrection, and indeed brought about the expulsion of the queen Maria Christina. In 1844, however, a similar Act was again introduced into the Cortes, and passed by unscrupulous intrigues; and this law, slightly modified by subsequent statutes, still remains in force.

AZALEA, in botany, is the name of a genus, founded by Linnaeus, belonging to the order ERICACEÆ, and consisting of shrubs remarkable for the beauty and fragrance of their flowers; on which account they are very generally cultivated in Europe. By Bentham and Hooker ("Genera Plantarum"), and other botanists of the present time, the genus is considered the same as *Rhododendron*, in which it is accordingly sunk; and it is evident that it is impossible to point out any positive character, except the thin and generally deciduous leaves, by which *Azalea* can be distinguished from *Rhododendron*. It will, however, be useful to speak of them apart.

Since the year 1734, when we have the earliest record of the existence of American azaleas in England, they have been so generally diffused, and have been so much altered from their wild characters by domestication, that it is no longer possible to trace them in a satisfactory manner back to their original types. It is not by merely raising them from seed that this deviation from their wild characters has been brought about, but also by their having been accidentally or artificially hybridized till all trace of their original forms is lost in new and unnatural features. We shall therefore state, in the first place, the characters by which the species are distinguished on their native hills, and then describe the modes of cultivation in this country.

Four principal forms exist, to one or other of which all the species are referable—1, those with glutinous flowers and short stamens; 2, those with glutinous flowers and stamens much longer than the corolla; 3, those with flowers that are scarcely at all glutinous, and stamens much longer than the corolla; 4, those with flowers that are scarcely at

all glutinous, and short stamens. These form the natural sections of the group.

GROUP I.—1. *Azalea viscosa*, has leaves shining green on both sides, fringed at the edge. It is a native of swamps, copses, and wet and shady woods in North America. It is a shrub from 3 to 8 feet high, with the young branches covered with numerous stiffish brown hairs. 2. *Azalea glauca*, has dull-green leaves, somewhat wrinkled and wavy at the edge, glaucous on the under side, fringed at the edge. It is found in clayey swamps in the middle states of North America.

GROUP II.—3. *Azalea nitida*, has branches with very few hairs, and small leaves rather leathery, shining, and smooth on both sides. This shrub grows in deep mossy swamps on the mountains of North America, from the state of New York to Virginia. 4. *Azalea hispida*, has its branches clothed with numerous stiffish hairs. The leaves are long-lanceolate, covered with bloom on both sides, hairy on the upper surface, and smooth on the lower. It is a native of the borders of lakes, and on the highest part of the Blue Ridge in the state of Pennsylvania. 5. *Azalea pontica*, has large leaves not shining, puckered, reflexed and wavy at the edge, green and slightly hairy on both surfaces. The flowers are yellow, long-stalked, covered with long hairs and glutinous glands. It is common in the Crimea, the Caucasus, and the eastern parts of Poland, rendering the whole country a brilliant garden with its golden fragrant flowers, during the month of May.

GROUP III.—6. *Azalea perilymena*, has flat leaves nearly hairless, except the midrib, which is bristly. The tube of the corolla is much longer than the limb, which is white. It is found wild on the sides of hills, in woods all over North America, where it is called Upright Honeysuckle, a name which it well merits for its fragrance and beauty. 7. *Azalea canescens*, has leaves which are hoary, especially beneath; their midrib without any stiff hairs. The tube of the corolla is about the length of the limb, which is white. It grows on barren sandy hills in the southern parts of United States, on the banks of rivers in South Carolina, and on the mountains of Virginia. 8. *Azalea calendulacea*, the leaves are convex, shining, bright green, slightly hairy on both sides, reflexed and wavy at the edge; their midrib without stiff hairs. The tube of the corolla is not longer than the broad orange-coloured or scarlet limb. It is a native of moist places in the southern states of North America, sometimes inhabiting the banks of rivers, but more frequently adorning the mountains with a garment of living scarlet. 9. *Azalea arborescens*, has its leaves covered on the under side by a glaucous bloom, and smooth on both sides. The tube of the corolla is longer than the segments; calyx with leafy divisions.

GROUP IV.—10. *Azalea sinensis*, has its leaves downy on both sides, sharp-pointed, glaucous beneath, reflexed and wavy at the edges. The flowers are covered externally only with a fine silkiness; their tube is much shorter than the bell-shaped limb, the divisions of which are acute. It was introduced from China about 1826, and is a native of that country. 11. *Azalea indica*, has obovate leaves, flat, green on both sides, and very abundantly clothed with stiffish brown hairs. The flowers are quite smooth externally; their tube much shorter than the bell-shaped limb, the divisions of which are rounded. The calyx is small and very lispid; stamens five. This and the following are the most beautiful plants which exist in the rich flora of China, where they far exceed in splendour of appearance the camellias, moutans, chrysanthemums, and roses of that favoured climate. 12. *Azalea ledifolia*, with leaves obovate, flat, evergreen, green on both sides, and clothed with brown hairs. A native of China.

The original and only *Azalea* of Linnæus (his *Azalea procumbens*) is now called *Loiseleuria procumbens*. It is a low trailing evergreen shrub, with small rose-coloured flowers

collected at the ends of the branches. In the British Isles it is found only on the tops of mountains in the highlands; but is widely distributed on high ground in the northern parts of Europe, Asia, and America.

The cultivation of azaleas must be divided into that of the hardy and that of the green-house kinds. Hardy azaleas succeed perfectly if planted in peat-earth mixed with about one-third or even one-half loam. They should be sheltered when young by one another, or by rhododendrons, which can be cut away as the azaleas advance in size, for they are natives of swampy situations, where they spring up among the bushes, and are, when young, completely protected from the scorching sun. The dampness of our climate renders it unnecessary to treat them as swamp plants; on the contrary, they succeed nowhere in England better than on the sides of dry hills or on elevated ground; but it is absolutely indispensable that the soil in which they grow should be screened from the sun, either by their own shadow or by that of other things.

For the green-house azaleas a mode of management essentially the same in principle, but different in application, is required. Forcing should commence gradually in a temperature of 50° or 55° during the month of January, keeping them gently moist; in February the heat should be increased, and as vegetation becomes more active moisture should be more frequently applied, along with a very small quantity of liquid manure. This mode of treatment must be persevered in, never allowing the temperature to rise above 75° or 80° at the utmost, until the flowers are expanded; after that has taken place the plants should still be kept growing till June or July, when waterings should be discontinued, except at intervals, and they should be allowed to sink to rest, in which state they are to remain till the succeeding January, great care being taken that during the whole of the growing time they are fully exposed to light, and that as much air as possible is given them. When about to be again called into life they should be shifted into new pots of a larger size than before, and supplied with fresh peat and loam.

AZAMGARH, a district and city in the division of Benares, in the North-western Provinces of India. The district lies between 25° 38' and 26° 27' N. lat., and 82° 44' and 84° 10' E. lon. Its area is 2500 square miles, and the population in 1882 was 1,600,000. The district forms part of the Gangetic plain. The chief river is the Gogra (Ghagra), known also as the Debla. Large quantities of rice are grown. The sugar-cane and indigo are also extensively cultivated. Silk and cotton goods are manufactured. The district is on the whole a healthy one, but fever is prevalent during the rains and after them. These begin, in normal years, in the third week of June and end in September. The cool season begins about the middle of October and continues till March.

AZAMGARH, the chief town, is situated on the river Tons, 81 miles N. of Benares, 109 N.E. of Allahabad, and 171 S.E. of Lucknow. It was founded in 1665 by Azam Khan. During the mutiny in 1857 the 17th Native Infantry murdered their officers and carried off the treasure to Fyzabad. The European inhabitants were twice compelled to take refuge at Ghazipur. The population in 1882 was 16,000.

AZANI, an ancient town of Phrygia, in Asia Minor, now in ruins. The inhabitants were called Azanites, or Azanites (Stephanus Byzantinus, "Azani"). Strabo (xii. 576) mentions Azani, Nacolia, and Kotyacion (the present Kiutaya) as towns of Phrygia Epictetus. The situation of Azani had been long a matter of doubt, until Mr. Keppel visited its remains and ascertained from the inscriptions that they belonged to the Azani or Ezani of the ancient geographers. It is situated 20 miles S.W. of Kiutaya, on the left bank of the river Rhyndacus, on which are two ancient bridges. A vast quantity of shafts of columns,

beautifully-worked capitals, entablatures, &c., lie scattered on the ground, and the Turkish village of Tjadveré Hislar has been built entirely out of the ruins. Rows of erect columns are still standing in several places. The finest remains are those of a temple and a theatre. The temple is on a hill, and is 116 feet in length, and 68 in breadth; thirteen out of fifteen pillars on the north side, and five out of eight on the west front, remain standing and in the highest preservation. Those on the east and south sides are overthrown, but lie close to their original position. They are of the Ionic order; the shafts are fluted, and made each of a single block of marble 28 feet in length. The walls of the temple on the north and west sides are also standing, but the other two sides have fallen. The theatre is 232 feet exterior diameter; the stone benches and part of the walls still remain. Some of the Greek inscriptions on the walls of the temple refer to the reign of Hadrian. Numerous coins of Roman emperors and others have been found in this neighbourhood.

A'ZAROLE. See CHATEAUGU.

AZEGLIO, MAS'SIMO TAPARELLI, MARCHESE D', a famous Italian artist, author, and statesman, was born in October, 1798, at Turin. Although educated for a military or diplomatic career, his love for art was so intense that his father, who had procured him an appointment in a Piedmontese cavalry regiment, was induced to give way and permit him to devote himself to painting. He soon acquired both skill and fame as a landscape painter; but having removed in 1830 from Rome to Milan, he there made the acquaintance of Alessandro Manzoni, whose daughter he married, and his thoughts were turned towards the political state of his country. In 1835 he published a novel entitled "Ettore Fieramosca;" and this book and the one that followed it, the "Nicolo de' Lupi" published in 1841, did very much towards awakening a spirit of patriotism and a desire for national unity among the Italian people. His own opinions were in favour of a united Italy under a constitutional monarchy; and he was opposed both to the division and despotism that prevailed, and to the efforts towards insurrection of the secret societies and republicans, which only ended in disaster. In 1846 he published a pamphlet entitled "Degli Ultimi Casi di Romagna," in which he advocated the necessity of a national policy of wise reforms and moderate liberalism. The fame of this work was such that when Pius IX. became pope he consulted D'Azeglio on many points of policy; and to his influence were ascribed many of the reforms with which Pius began his government. In 1848 he accompanied the Papal troops which were sent to support the rising of Lombardy and Venetia against the Austrians, and in the battle of Vicenza he was severely wounded in the leg. He was compelled to retire from the war; but his pen was unceasingly active, and ever directed towards keeping the national movement free from the excesses advocated by the republican party. After the defeat of the Italians at Novara in 1849, and the consequent abdication of Charles Albert, the new king of Sardinia, Victor Emmanuel, appointed D'Azeglio president of his cabinet, a post which he sustained with great benefit to his country till 1852, when he was succeeded by Count Cavour. On the close of the war of 1859 he was appointed to the military office of general and commissioner extraordinary for the Roman states, and in this capacity he displayed the same spirit of conciliation, unselfishness, and patriotism by which he had ever been characterized. He died 15th January, 1866. His memoirs ("I miei Ricordi") were published in 1867, and his "Political Correspondence" in 1866.

AZERBIJAN, the most northerly province of Persia. It is surrounded by Kurdistan, Irak-Ajemi, Ghilan, and the Russian and Turkish dominions, and extends from 36° to 40° N. lat., and from 44° to 48° 40' E. lon. The

surface is mountainous, the highest points being Mount ARARAT (17,212 feet) and Mount Savatan (18,000 feet). The principal rivers are the Araxes [see ARAS], which forms its N. frontier, and the Kara-Su. The large salt lake of Urumiyeh, 4100 feet above the sea, and about 300 miles in circumference, is also in this province. The valleys are fertile, yielding wheat, maize, rice, cotton, hemp, madder, tobacco, saffron, and various kinds of delicious fruits, so that this is considered one of the most productive portions of the Persian dominions. The alterations of temperature are considerable, but the climate is healthy. The chief town is TABREEZ.

AZIMGARH. See AZAMGARH.

AZIMUTH, a corrupted Arabic word, which when properly written is *as-samut*, the *as* being the article *al* assimilated to the initial letter of the word to which it is prefixed; *samut* (plural *samut*) means "a way," "a road," "a path;" also "a quarter" of the horizon. (The same word *samt* gives us "zenith.")

The azimuth of a celestial body is the angle contained between the plane of the meridian of any station and that of a vertical circle passing through the body. Thus *c* being the place of the spectator supposed to be at the centre of the earth, while, in the celestial sphere, *z* is the zenith of his station, and *r* the pole of the equator, so that *z r n* represents a quadrant of the meridian, and *z s a* a quadrant of a vertical or azimuth circle passing through *s*, the place of the body; then the angle *a c n* or the spherical angle *r z s* is the azimuth of *s*.

If the polar distance *r s* of a celestial body, the co-latitude *z r* of the station, and the zenith distance *z s* of the body be given, the azimuthal angle *r z s* may be computed by spherical trigonometry.

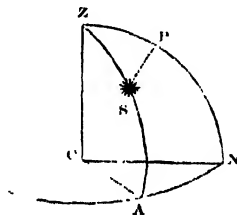
An instrument is said to be moved *in azimuth* when it is turned on a vertical axis, so that any line in it drawn through the axis points to the same altitude in the heavens, but not to the same azimuth. Similarly an instrument is moved *in altitude* when it is turned on a horizontal axis. An altitude and azimuth instrument is one which admits of both motions.

AZINCOURT. See AGINCOURT.

A'ZOF or **A'ZOV** (Turkish, *Assak*), a port of southern Russia, and once a fortress of great celebrity, gives its name to the adjacent gulf of the Black Sea. It is situated on an eminence washed by one of the principal arms of the Don, at a distance of 20 miles from its mouth, and 360 miles to the south-east of Ekaterinof, the capital of the Russian province to which it belongs. From the twelfth to the eighteenth centuries it changed owners frequently, but it finally became annexed to Russia in 1774. It has now lost all traces of its former importance, and is only a collection of filthy, miserable cabins, chiefly occupied by fishermen. Its fortifications are decayed; the branch of the river is choked with sand, and its once busy port is sunk into a deserted haven.

A'ZOF, SEA OF, is commonly considered as a part of the Black Sea, but being a close sea, united to the Euxine by the Strait of Kertch or Yenikale, and disfeeing from the Black Sea in many peculiar features, it is rather to be considered as an independent piece of water.

This sea extends from the eastern shores of the peninsula of the Crimea in an E.N.E. direction to the embouchure of the river Don. If the outlet of the Don, and the most western creek formed by the Putrid Sea, near Perekop, on the isthmus of the Crimea, are considered as



its two extremities, it extends from $38^{\circ} 40'$ to 39° E. lon. Its whole length, therefore, is upwards of 200 miles, and its breadth about 110. From S. to N. it extends from $45^{\circ} 20'$ to $47^{\circ} 20'$ N. lat., but its breadth varies in different places. The north-eastern portion of it is a long bay, which may be called the Bay of Taganrog. The entire sea covers a surface of upwards of 14,000 square miles.

The depth in the centre, where it is greatest, is in a few places $7\frac{1}{2}$ fathoms, but on an average it is only between 6 and 7, and this depth continues to the Strait of Yenikale, by which it is united with the Black Sea. Towards all the other shores its depth decreases to 5 fathoms, and even $4\frac{1}{2}$, and within the Bay of Taganrog the water is so shallow as greatly to impede navigation. This shallowness was well known to the Greeks; and it was the prevailing opinion in the time of Aristotle that the sea was rapidly filling up by the earthy matter brought down by the rivers which discharge into it (Aristotle, "Meteorologica," i. 14; also Polyb. "Hist." iv. 42).

The water is drinkable, but always has a disagreeable flavour. Fierce winds from the E. prevail during July and August, and in the latter part of the year those from the N.E. and S.E. are not unusual. After south-westerly winds have continued for a time the water becomes brackish by being mixed with that of the Black Sea. It is usually frozen every year from November to the beginning of March. There is perhaps no equal extent of water on the whole surface of the globe which abounds so much in fish—in fact the Turks called it the *Fish Sea*. The most important fisheries are along the southern coast, between Cape Dolgava and the Strait of Yenikale; the sturgeon, the sterlet, the buegal, and the singa, are caught in great numbers; and large quantities of caviar and isinglass are prepared.

The most western part of the Sea of Azof, which was named the Putrid Sea by the Greeks, and by the Russians Siwash, is separated from the main body by a narrow sandy strip of low land, which at its northern extremity leaves a narrow opening as a channel of communication with the sea itself. During the greater part of the year it is a noxious swamp or quagmire. The Strait of Kertch, which unites the Sea of Azof with the Black Sea, was called by the Greeks the Cimærian Bosphorus. This strait is about $10\frac{1}{2}$ miles long, and at the narrowest parts nearly 4 miles broad, but the navigable channel does not exceed a mile. Its entrances are shallow and extremely intricate, with a depth of water seldom exceeding 12 feet. On each side it is lined by low sandy hills, and is frequently frozen over, though the water is always brackish.

The country surrounding this sea indicates that it is one of those lakes which are designated by the name of steppolakes, and that it ought to be compared with the northern part of the Caspian Sea and with the Sea of Aral. The northern shore is mostly formed by a narrow and low belt of sand, but the southern has more of a marshy character. The Strait of Yenikale is bounded on the Asiatic side by a part of the island of Taman, and on the European side by the Peninsula of Kertch.

The sea is of importance to Russian commerce, and the towns of Beldiansk, Mariapol, Taganrog, Kertch, and Yenikale have grown up on its coasts. In consequence of the shallowness of the water large vessels are obliged to remain several miles out at sea, and receive their cargoes by means of lighters.

AZOIC AGE (Gr. *a*, not; *zōon*, living being), in geology, is the age in the earth's history preceding the appearance of life. The rocks that were formed from the period of universal fusion down to the time when the waters were fitted for life, are called azoic. Whether such rocks have not all been disintegrated and denuded away is a difficult point to determine, for the mere absence of fossils is no test. Some confusion has been introduced by extending the term

to rocks which, without affording any evidence of the existence of animal life, nevertheless include other rocks due to the presence of vegetable life. Anthracite, for instance, occurs in small pieces in the iron-bearing rock of Arendal, Norway; and graphite is formed in limestone and other strata. Both these substances are formed by the exposure of coal to a great heat; and coal, it is well known, is of vegetable origin.

AZORES are a group of islands situated in the North Atlantic, about 795 miles from the west coast of Portugal. They consist of nine islands in three distinct groups, lying in the direction of W.N.W. and E.S.E., and extending about 830 miles. The north-western group contains the small islands of Corvo and Flores, distant about 114 miles from the central group, which includes Terceira, St. George, Pico, Fayal, and Graciosa. The third group, 69 miles to the S.E. of the second, is composed of the two islands of St. Michael and St. Mary, and the Formigas Rocks.

The geographical position of the group is included between the parallels of $36^{\circ} 57'$ and $39^{\circ} 45'$ N. lat., and the meridians of $24^{\circ} 55'$ and $31^{\circ} 15'$ W. lon. The chief islands are noticed under their respective names. The population of the entire group in 1883 was 265,000.

The history of these islands is somewhat obscure. They do not appear to have been known to the Greeks or Romans, but from the large number of their coins found in Corvo it is presumed that the Carthaginians must have visited it. The islands are referred to by the Arabian geographers in the twelfth and fourteenth centuries, and are found distinctly marked in a map of 1351. In 1430 Joshua Vanderberg of Bruges, in a voyage to Lisbon, was driven westward as far as the Azores by stress of weather. Boasting of his presumed discovery on his arrival at Lisbon, the Portuguese government immediately fitted out an expedition, and took possession of the islands, to which they gave the name of Açores, from the number of hawks or falcons found on them, the Portuguese word *agor* (Latin, *accipiter*) signifying a bird of prey or hawk. They were then entirely destitute of inhabitants, and of every animal except birds, which were numerous and of various species. So much importance was attached to the acquisition of these islands that in 1449 Don Henry, prince of Portugal, proceeded there in person to take a more formal possession of them. In 1466 they were given by Alfonso V. to his aunt the Duchess of Burgundy, and colonized by Flemings, who, however, appear always to have recognized the authority of the King of Portugal. They fell under the dominion of Spain when Philip I. seized the vacant throne of Portugal in 1580, and so continued till the restoration of the house of Braganza in 1640, since which they have remained in undisturbed possession of the Portuguese.

All the islands are of volcanic origin. Though there is no visible volcano now in operation, the effects of internal heat and disturbance are seen not only in the calderas, or fountains of boiling water, which exist in many parts, but in the frequent and disastrous earthquakes to which the islands have been subject. The most formidable on record occurred in 1591. It continued twelve days without intermission, and entirely destroyed the flourishing town of Villa Franca in the island of St. Michael. The last eruption that took place was in 1881, and was very severe. There have also frequently been submarine volcanoes, throwing up rocks and islands from the bottom of the ocean.

The soil, which is formed entirely of volcanic substances, is very fertile. The lava districts are cultivated with vines, oranges, and lemons; but where decomposition has afforded richer land it yields wheat, Indian corn, beans, &c. Both European and tropical fruits arrive at the greatest perfection; and the face of the earth is so diversified as in many places to exhibit within a small extent gardens of aromatic flowers, pastures, vineyards, orangeries, &c. The

islands, though still abounding in uncultivated lands, produce more than sufficient for the supply of the population. Vessels touching at any of them are certain of being able to procure an abundant stock of refreshments; and the cattle are excellent. The orange trade has fallen off very much in recent years in consequence of the successful competition of Valencia, in Spain.

The general character of the islands is mountainous, of a conical form, and great bulk. The most remarkable among them is the Peak of Pico, of which the height is about 7500 feet.

The climate is mild and beneficial for invalids. The winter, although often attended with heavy storms, is not severe, nor are the heats of summer oppressive, surrounded as these islands are by such an expanse of ocean. The climate and natural advantages are in many respects equal, if not superior, to those of Madeira; but as yet the islands have met with little attention from either the tourist or invalid.

AZTECS is the name of a tribe who settled last in that part of America now called Mexico, or New Spain. They were living as a tribe about the year 1160 of our era, in Aztlan, a country situated to the north of the Gulf of California. About this time they crossed the Rio Colorado, or Red River, at a point beyond 35° N. lat., and proceeded south-eastward to the river Gila, where they lived for some time, as appears from the ruins of certain ancient buildings found on the banks of that river. After occupying an unimportant place among the various tribes for many years, they gradually acquired, by the early part of the fourteenth century, a paramount influence, and their chiefs became the rulers of the whole country.

The government of the Aztecs was at first aristocratical. A body of twenty men of the most distinguished in the tribe presided over the affairs of the nation. In 1373 they altered this form of government, and chose for their king Acanapichile, a noble chief of their own tribe. On the death of Huiztilhuitzin, the second king of Mexico, it was established as a law that four of the nobles should elect the king out of the collateral relations of the deceased monarch, to the exclusion of his children. This law continued till the destruction of the empire. Montezuma-Ilimicamina, the first of that name, was the great legislator of the Aztecs. He also erected the great teocalli of Mexico, made several important conquests, and after the great inundation which took place in 1446, ordered the construction of a magnificent dyke, 9 miles long and 16½ feet wide. In a succession of wars with the surrounding states the Aztecs extended their dominion over all the country comprising the modern districts of Vera Cruz, Oaxaca, Puebla, Mexico, and Valladolid, an extent, according to Humboldt, of from 18,000 to 20,000 square leagues.

The emperors were at first not allowed to undertake any affair of importance which could affect the community without first consulting the three supreme councils of the nation. These councils were composed of the nobility. But with the power acquired by conquests the emperors gained every day more ascendancy over the nation until, under the Emperor Montezuma II., the Aztec government degenerated into a complete despotism.

In every commune there were municipal officers elected by the inhabitants. There were also officers who patrolled and watched during the night. In matters of importance the judges were bound to consult the king. Every month, or rather every twenty days, all the different judges assembled before the king, when all the causes still left undecided in their respective tribunals were finally settled. The criminal laws of the Aztecs were very severe. Treason, voluntary homicide, robbery of gold or silver, theft in the market-place, adultery, and incest were crimes visited with the utmost rigour of the law. Drunkenness in a young man was punished by hanging, and throwing the body

afterwards into the lake, if the offender was of a noble family; if he was one of the common people, he was made a slave for the first offence, and hung for the second. At the age of seventy a man or a woman might get intoxicated with impunity. No advocates were in use among the Aztecs. The criminal himself conducted the defence of his own cause. No other proof could be adduced except the evidence of witnesses, and in the absence of witnesses the criminal was allowed to clear himself by an oath. They swore by the sun. The form of taking this oath was to touch the ground with two fingers and then carry them to their mouth.

Among the Aztecs lands were held by different tenures. Some possessed them in full ownership, and were allowed to transfer them either by sale or devise; others held them along with certain offices, and consequently could not dispose of them. The lands were apportioned among the king, the priests, the nobles, and the people. Of these the nobility alone were full owners; the other three merely enjoyed the use. The common lands were cultivated in common, and the produce was deposited in storehouses, from which all the inhabitants were supplied gratis according to their wants. All the inhabitants of conquered countries were obliged to pay tribute. Slavery was admitted among the Aztecs. Slaves were either bought, or persons became so as a punishment for certain crimes; but the son of a slave was in all cases a free man.

The Aztecs had some imperfect idea of a Supreme Being, absolute and eternal, to whom worship was due. They believed him to be invisible and incorporeal, and therefore no representation of him was either painted or sculptured. They gave to this being the name of Teotl. They also believed in the existence of an evil spirit, called by them Tlacatecolotl, whom they supposed to be always employed in causing evil to mankind. The souls, both of man and beast, they believed to be immortal. According to their notions of a future state, there were three different mansions where men enjoyed a future state of existence. Besides the Supreme Being the Aztecs worshipped innumerable divinities. These divinities were worshipped by offering to them sacrifices of human victims, of animals, plants, flowers, and fruits; by prayers, hymns, fastings, and other rigorous penances, in which the worshippers frequently shed their own blood. The human sacrifices were so horrible that the simple recital of them excites disgust, and so frequent and numerous that the Mexican historians calculate that no less than 20,000 victims perished every year; but this must be a great exaggeration. The priests were very numerous. Besides serving in the temple, they were employed in educating the youth, in painting the annals of the empire, in forming and regulating the character, in composing hymns, and in other scientific and literary pursuits. There were also persons of both sexes devoted to the service of the gods, who lived in retirement, practising very severe austerities.

The Aztecs attended very assiduously to the instruction of their children. From the third to the fifteenth year they were instructed in their houses by their parents. At the age of fifteen they were sent to the temples or to some private school to be taught those acquirements which their parents were unable to impart to them. Marriage and burial ceremonies were regulated by law.

The manner adopted by the Aztecs of computing time shows that they had attained a certain degree of astronomical knowledge. They had a solar year of 365 days, divided into eighteen months, of twenty days each. The five complementary days, which they called nemontemi, or useless, were added to the last month. The year was represented in their paintings by a circle, in the centre of which they placed a figure intended to represent the moon illuminated by the sun; and in the circumference they placed the symbols of the eighteen months. The month

was divided into four periods of five days each. Thirteen of their years formed a period analogous to the Roman Indiction, which they called *tlalpili*; four *tlalpili* formed a *xiuhmōpili*, or ligature of years; and two *xiuhmōpili* a *huchuetiliztli*, or old age of 104 years. Instead of adding one day every fourth year as we do, they added thirteen days every fifty-two years. They had also a lunar year, by which they regulated their sacred festivals. They ascertained the hour in the daytime by the sun, and at night by the stars. The names of the different months were taken from some festival or from some circumstance which usually happened in the month, and the same was observed with regard to the names of the days. The days were all designated by a particular name. At the end of every *xiuhmōpili* they held a religious festival somewhat analogous to the sabbatic year of the Jews.

The Aztecs had made some progress in the arts of social life. The monuments of architecture, sculpture, and painting which still exist, though very far behind that degree of perfection which these arts had obtained among some of the nations of the old continent, are not devoid of merit. The Aztec painters had no knowledge of perspective, nor of light and shade. Their designs are coarse and uncouth; their figures are fantastical, and only drawn in profile, but they are remarkable for the brilliancy and durability of their colours. Their works of architecture and sculpture evince a far superior degree of excellence. The dress of the men consisted merely in a sash tied round the waist, with the two extremities hanging before and behind, and a square mantle, 4 feet long, the two extremities of which were tied upon the chest. This mantle covered the shoulders and all the body behind. The women wore a square piece of stuff tied round their waists, which descended to their ankles, and a sort of waistcoat without sleeves. The stuff used by the poor was made of fibres of the aloe, and that of the nobles of cotton embroidered with feathers or rabbits' hair. Their shoes consisted in a sole cut out of the leaves of the aloe, fastened to the foot with a cord. The kings wore instead thin plates of silver, gold, or copper. None of the Aztecs ever cut their hair, with the exception of the virgins who were consecrated to the service of the temples. The men tied it on the crown of their heads, and the women let it hang down their shoulders. Both men and women wore rings and other ornaments in their ears, nose, and under lip, as also collars and bracelets.

They had public roads and inns, also bridges, some of which were suspended over the torrents. These suspension bridges consisted of a sort of hammock, made of aloe-fibre, and suspended from trees on each side of the stream.

Very extensive and interesting Aztec ruins are found scattered throughout New Mexico, Arizona, and Northern Mexico. There is scarcely a valley in the Rio Grande basin in which the stone or adobe foundations of villages are not to be found; nor a spring, lagoon, or marsh upon the plateau which is not overlooked by some ruined fortress, usually on the crest of a commanding eminence. If a stream runs near them, the remains of acequias, or irrigating canals, are generally to be found.

The Aztecs were not acquainted with the art of alphabetic writing, but used hieroglyphics. The objects were represented either in full or by such a part of them as was considered sufficient to convey the meaning of the painter. To record the events of their history they painted round the

canvas signs of the days or years, and close by each sign the hieroglyphics representing the event which at that period had taken place.

Fortunately the sources on this subject are open, and easily accessible in the pages of Salugun, Solis, Clavigero, and Prescott. To the published data it only remains for us to add the following chronological table from an unpublished Mexican painting or MS. in possession of Mr. E. G. Squier:—

Aztecs leave Aztlan,	1164
Arrive in valley of Mexico,	1216
Temotzintlatoni begins to reign,	1324
Acamapichtli, second king,	1373
Huitzilhuiztin,	1394
Chimalpopoca,	1415
Hue Monetequimatzin (Montezuma I.),	1438
Axayacatzin, King,	1471
Ticocicatzin ("Tizoc"),	1480
Monetequimatzin (Montezuma II.),	1502
Entry of the Spaniards,	1519

AZU'NI, DOMENICO ALBERTO, was born at Sassari, in Sardinia, in 1749. He applied himself early to the study of the law, and paid particular attention to the maritime regulations which have often been matter of dispute between nations. In 1795 he published his "*Sistema Universale dei Principii del Diritto Marittimo dell' Europa*." He afterwards recast his work, and published it in French at Paris, with the title of "*Droit Maritime de l'Europe*" (two vols. 8vo, 1805). This work recommended Azuni to Napoleon's ministry, who appointed him one of the commissioners for the compilation of the new commercial code, and intrusted him with the part relative to maritime affairs.

In 1807 Azuni was appointed president of the Court of Appeal at Genoa, which city and territory had been annexed to France, where he continued his functions until the fall of Napoleon. He was soon afterwards appointed by King Charles Felix judge of the consulate of Cagliari, and librarian to the university of the same city. He died at Cagliari in January, 1827.

AZURE, a fine blue colour like that of the sky. The word is derived from the Middle English (thirteenth century) *asur*, which was the Old French *azur*. But it should really be *lazar*, which in the middle ages came to be written *lazar*. So our "a nadder" stands now in the corrupted form of *an adder*, the initial *n* being assumed to be part of the article, just as, in the present example, the letter *l*. *Lazar* was Low Latin for *Lajvar*, the Arabian name of the mine where the blue stone lazur was found, that stone which we now call Lapis Lazuli. Azure is technically used in heraldry to signify a blue colour in the coats of all persons under the degree of baron. In engraving arms it is represented by horizontal lines.

AZURE STONE. See LAPIS LAZULI.

AZURITE is a mineral resembling malachite, but of an azure-blue colour. It is also a carbonate of copper, but though quite as beautiful as malachite it is not often used for ornamental work. When found in sufficient quantity this ore is a valuable source of copper. It is generally found crystallized in modified oblique rhombic prisms, but also occurs massive and earthy. Another name for azurite is *chessylite*, from Chessy in France, the locality where it is found more abundantly than elsewhere.

B is the second letter in all alphabets derived from the Phœnician, even therefore in Hebrew as well as in the European examples of the Indo-Germanic tongues. The Phœnician and Hebrew languages (and therefore also their alphabets) were written from right to left; but Greek, after a trial of this method and then of the curious method called *boustrophedon* (up one line and down the next, like an "ox ploughing a furrow," whence its name), settled down into the present familiar plan; and the languages of Europe (and therefore their alphabets) run from left to right in consequence.

Egyptian research seems to have quite established it as a fact that the Phœnician language was derived from the hieroglyphic picture-writing of Egypt, and many prototypes of our letters have been recognized in writing of 4000 years ago. *B* is found to have originated in a picture of a bird, as *a* in that of an eagle, *d* in that of a man's hand, *f* in that of a horned viper, &c. The name *B* is of course short for *Beta*, the Greek name for the same letter, and this, together with the Hebrew *Beth* (meaning "a house"), was no doubt an approximative sound to the ancient Phœnician or Egyptian name, whatever that may have been.

In power the letter *b* is classed with us amongst the labial mute consonants. Mutes are those sounds which arise, not from the passage of the breath through the throat and mouth, as in the vowels and the sibilant and spirant consonants, but from the prevention of that passage by a more or less firm closure of the lips or the throat, or by a closure made by the tongue against the teeth; and a *labial* mute is one produced by the closure of the lips (*labia*), audible therefore, like all the other mutes, only when the pressure is removed. *P* is purely the true labial mute; but if, while the closure of the lips lasts, a small stream of air just enough to set the vocal chords vibrating, and therefore to give a sound, be allowed to pass into the closed mouth, we produce not the sord mute *p* but the sonant mute *b*. The difference between *pop* and *bob* is practically nil in whispering, but their difference in ordinary speech is that the sonant utterance of the *p* begins after the closure of the lips has ceased, and that of the *b* just before it has ceased. This explains why the modern Greeks, having lost the mute sound of the labial *b*, and converted it into a spirant labial (*v*), endeavour to construct a fictitious *b* by the combination *mp*, as mentioned below. Herein they would be quite in error if they really sounded *mp* for *b*, because the nasals (*m*, *n*, *ny*) differ from the sonant mutes (*b*, *d*, *g*) by the slight sound-causing stream of air passing through the nose with the nasals instead of into the closed cavity of the mouth as with the sonant mutes; therefore not the dull stifled sound of the sonant mute (as *b*), but a ringing sonorous sound (as *m*), approximating almost to an open vowel, is produced. The approximation of *mp* to *b* is very much nearer than at first sight it appears, of which the reader may satisfy himself by a slight personal trial; but it is almost needless to remark that the modern Greek *mp* is pronounced simply as our *b* in every respect, and is a conventional sign used for *b* to prevent *v* being spoken.

B readily interchanges with other labials.

1. With *v*, as *habere* (Latin), *avere* (Italian), to have; *habebam* (Latin), *aveva* (Italian), I had. So English *cavalier*, from Latin *cavallus*, &c. In Spain, and the parts of France bordering upon Spain, the letter *b* often occurs in words which in the kindred languages prefer the *v*.

The modern Greeks pronounce the *b*, or second letter of their alphabet, like a *v*; thus *βασιλεως* (*basileus*) is pronounced *vasilefs*. When they write foreign words, or words of foreign origin, it was until lately usual for them to express our sound of *b* by *mp*, as *μπαϊζον* (*mpaizon*) for *lyron*. (Now, however, amongst the cultured classes the name would be written in its native spelling, and pronounced after the laws of its own tongue.) It appears probable that the ancient Greeks pronounced the *b* more like the Spaniards and modern Greeks than we do; for they wrote the Roman names *Varro*, *Virgilius*, thus—*Βαρρόν*, *Βιργίλιος*. The Macedonian Greeks wrote *Philippos* thus—*Βιλιππος*.

2. The interchange of *m* and *b* takes place very frequently, especially when they are followed by the liquids *l* or *r*. Thus *malakos* and *blax* are two forms of the Greek word for "soft;" and *broto*, the Greek for "mortal," and *mor-i*, the Latin for "to die," contain a common root. An interchange of a similar nature marks the difference between the Greek *molubos* or *molubidos*, lead, and the Latin *plumbum*. If an *m* in the middle of a word be followed by either of these liquids the *m* is retained, but is strengthened by the addition of a *b*, just as a *d* inserts itself between *n* and *r*. Instances are to be found in nearly all languages: *mesēmeria*, mid-day, was reduced by the Greek ear to *mesembria*; the Latin *cumulare*, to heap, has been changed to the French *comblér*; the Latin *numetus*, to the French *nombre*, our *number*, &c. The Spanish language has examples of a still greater change. Thus, if a Latin word contain the letters *min* after an accented syllable, we find in the corresponding Spanish term the syllable *bre* or *bra*: *homine* (Latin), *hombre* (Spanish), man; *femina* (Latin), *hembra* (Spanish), female; *famulus* (Low Latin), *hambre* (Spanish), hunger. This corruption arises from a previous interchange of the *n* into an *r*, as in *diavonos*, Greek, deacon, *dicre* in French. Further, *m* often drags in an interpolated *b*, which has no other excuse than a perverted analogy, as in *limb*, which is (or should be) simply the Old English *lim*.

3. *B* interchanges with *p*. Of this the pronunciation of the English language by the Welsh and Germans presents a living example.

4. With *f*, as *barley*, from Latin *far*, corn; and as the following "doublets" (or pairs of words derived from the same root by different etymologies), *brother*, *friar*; *briar*, *furze*.

5. *Du* before a vowel in the Old Latin language became an *b* in the more common forms of that language. Thus, in the old writings of Rome, we find *duonus*, good; *duellus*, fair; *duellum*, war, &c., in place of *bonus*, *bellus*, *bellum*. The Roman admiral Duilius is sometimes called Bilius; and in the same way we must explain the forms *bis* and *duis*, whence our doublet-forms *bi* and *du*, as "biseet," "dual," &c., and *viginti* (*dui-ginti*), twenty (*twain-ty*), compared with *thir-ty*, &c.

6. *B* before a vowel has taken the form of a soft *g* or *j* in several French words derived from the Latin: *cambiare*, a genuine Low Latin word; *changer*, French; *change*, English: *rabies*, Latin; *rage*, French; *rage*, English (with a double form *rane*, derived directly from the Latin, by rule 1, *b* turning into *v*): *Dibion*, *Dijon*: so likewise *rouge* has for its parent the Latin "red," *rubens*.

7. In some dialects of the Greek language a *b* exists (apparently as a kind of aspirate) before the initial *r*,

where the other dialects omit it; as *brodon*, a rose, &c. Again *bl* and *gl* are interchanged in dialects of the same language. Thus *balanos* (Greek) and *glans* (Latin) are perhaps related words; as well as *blandus* (Latin), signifying soft, mild, calm, and *galenos* (Greek), which has the same signification.

The reader is referred to the article GRIMM'S LAW for an explanation of the now thoroughly established theory, first put forward by the celebrated philologist Jacob Grimm, which brings these variations of mute consonants under a curiously accurate classification. In this place, therefore, only the briefest possible notice is necessary of this part of the subject. *B* has been above shown to be a sonant mate of the labial order, and the older word for "sonant" was "medial." We should hardly mention this ("sonant" being so infinitely the better designation—it is given in Professor Whitney's "Language," p. 62, third ed., 1882), if it were not for a neat mnemonic formula of Professor Earle's which he introduces into his "Philology of the English Tongue" (third ed., 1880), and which it seems desirable to give here. Professor Earle points out that if *T* stands for *thin* consonants (Whitney's *surd*s, i.e. *p*, *t*, *k*) and *A* for *aspirates* (Whitney's *spirants*, i.e. *f*, *th*, and the soft Scotch *ch*), whilst *M* represents the *medials* (Whitney's *sonants*, i.e. *b*, *d*, *g*), then the Latin word *TAM* may be set letter for letter against the German word *AMT* (AMT), and the connection between the languages is made apparent—

T A M
 AMT

Without going further into the development of this remarkably ingenious formula than the immediate subject demands, it may be pointed out that a (*ß*) medial consonant, or "sonant," in the Teutonic languages corresponds in most cases to an (*A*) aspirate, or "spirant," in the classical languages. An excellent example of the change of *f* to *b* was given above in the Teutonic *bruder*, brother, derived not so much from the Latin *frater*, with which it corresponds, as from the ancestral tongue which gave rise to both. Professor Earle goes on to connect the variations between High Dutch tongues (represented in many ways by the German of to-day) and Low Dutch tongues (as Dutch and Saxon-English) by a similar formula. He uses the German word *tamt* (*samt*) and the English word *tame*,

t a m
 tamt

the initial *s* in the German serving another purpose also, and the final *e* in the English merely being there to complete the word. Here we find (amongst other things) the German medial answering to the English aspirate, the German *thin* to the English medial; or, as it would run in Professor Whitney's nomenclature, the German sonant goes with the English spirant, the German surd with the English sonant. Bringing this to the test of the present article, that is to say German *b* answers to English *f* if altered, German *p* to English *b*. This is apparent if we consider such examples as *laub* (*laub*), life, *liebe* (*liebe*), love, on the one hand, and *stoppel* (*stoppel*), stubble, *krippe* (*krippe*), crib, on the other.

B, in music, the second letter of the musical alphabet, and the second note of the scale of the ancient Greeks in the Hypodorian mode. [See GREEK MUSICAL SYSTEM.] Our own typical diatonic scale, however, is that of C, and in this B is the seventh note. The French and Italians, who use the well-known *do re mi* syllables instead of letters to designate notes, call B accordingly *si*. This must not be confounded with the sol-fa use of *si* as meaning the seventh of any key, for its use abroad, referred to above, is absolute and not (as with us) relative. *Si* simply means the key of B \flat , or the note B \flat , in the countries mentioned. The Germans

have a much more confusing nomenclature. With them B means the note we call B \flat , and for the note we call B the Germans use H, thus importing an eighth letter into the musical alphabet. A German would conclude the scale of C thus—G A H C; and would begin the scale of F thus—F A B C. (It is hardly necessary to mention that in all other countries these passages would be written G A B C, F A B \flat C respectively.) The reason of this is curious. There being no accidentals in use in the dark ages, the scale of F with a B natural was unendurable, but by the happy expedient of softening the B into B *molle* (soft B) by flattening it a semitone, the scale was made quite harmonious. The new B *molle* was written *b*, and the old B (B *durum*, hard B) was still written *b*, and sounded the half tone higher. In ACCIDENTALS it has been shown how the first gave rise to the \flat and the second to the \sharp , which is a half tone higher. This latter sign, being much like the \flat of the Germans, came actually to be called by them H, and the B *molle* monopolized their letter B. The French name for "flat" (*b*) is even now "soft B" (*bémol*), and the German name for "flat" (\flat) is *Be*, or simply B, which has in German the same sound. What we call flat-keys Germans call B-Tonarten.

In consequence of the survival of this blunder of the dark ages, German musicians are able to write fugues on the great name of BACCH, prince and patron of fugal work, which in music stands as under:—

The best of these are by Schumann and Liszt, if we except those by Bach himself.

There was no authentic church mode from B, as its fifth was imperfect. See MODES, ECCLESIASTICAL.

BA'AL, a Semitic word signifying lord, owner, master, and also husband. It was the name of the supreme male deity of the Phœnician and Canaanitish nations. It is used in the plural also (Baalim), like the Hebrew Elohim, which is translated in our Bible by the word God equally with Jehovah.

The worship of Baal undoubtedly existed from a very early period, for we read of the Israelites being seduced from the worship of Jehovah to worship Baal-peor during the journey through the wilderness (Num. xxv.), and again in the Book of Judges (ii.) we read that in the generation following Joshua the children of Israel forsook the Lord "and served Baal and Ashtaroth." There appear to have been two forms of the worship of this deity among the Israelites, viz. that which they found existing in Canaan and the surrounding nations at the period of their conquest, and the more elaborate worship of the Tyrian Baal introduced by Jezebel on her marriage with Ahab. The early Israelites appear to have conceived Jehovah, the God of Israel, to be one among other gods, and hence were easily led into the practice of also worshipping the gods of the nations around them—a practice, however, which met with strong opposition from the prophets and those among them who had attained to the conception of monotheism.

After the division into the nations of Israel and Judah the worship of Baal gradually became the national religion of the ten tribes; and though the worship of Jehovah was occasionally enforced and that of Baal prohibited, as during the reigns of Jehoram (2 Kings iii.) and of Jehu (2 Kings x.), yet it seems to have retained its place until the period of the captivity. It also made considerable way in the kingdom of Judah, and appears to have been the religion of the king and his court during the reigns of Ahaziah (2 Chron. xxii.), Ahaz (2 Chron. xxviii.), and Manasseh (2 Chron. xxxiii.), being carried on in the very temple built for Jehovah (2 Kings xxxiii.)

The statues erected to Baal, with the temples and altars, were chiefly placed on the tops of hills, amidst groves of trees, and also on the roofs of houses. The worship gave employment to a numerous priesthood, who burned incense, offered sacrifices (sometimes of children), and who appear to have manifested much excitement during the worship—leaping upon the altar, dancing round it with frantic shouts, and even, in their frenzy cutting their flesh with knives and lancets until they streamed with blood.

As to the origin of the worship of Baal but little can be ascertained. He appears to be identical with the Bel of the Assyrians and Babylonians, the maker of heaven and earth. By the Phœnicians he was regarded as the sun-god and the male principle of life (as Ashtaroath represented the moon and the female principle), and as may be judged from the account of the transgression with Baal-peor given in the Book of Numbers, his worship was often associated with gross sensuality. The Phœnicians worshipped the sun as the only lord of heaven, under the name of Beelsamen, whence probably came the notion of Baal being the same as the sun; whereas Baal and Ashtaroath are the deities of the sun and moon, as are Apollo and Artemis amongst the Greeks, and by no means the luminaries themselves, nor even limited in their power to the sway of those orbs.

As the Greeks, Germans, and other nations frequently form the names of men by compounding them with the names of God (for example, *Gottlieb*, *Gottbold*, *Theophilus*, *Timotheos*, *Amadeus*, &c.), so the name Baal is frequently used in combination with other words in the Hebrew and Phœnician languages. Thus one of the sons of Saul was named Esh-Baal, and one of the sons of Jonathan Merib Baal (1 Chron. iv.). Hannibal is written in Punic inscriptions in a form which contains the termination Baal—"a grace of Baal." So also, Hasdrubal means "help of Baal." In Hebrew also many names of cities occur compounded with Baal, as Baal-Gad, Baal-Hammon, Baal-Thamar, &c. Among other compounds are the names Baal-Berith, signifying the "covenant Baal;" Baal-peor, "Baal of the opening" (the Priapos of the Moabites); and Baalzebub, "the god of flies" (our Beelzebub).

At a later period of the history of the Jewish nation, when idolatry had become hateful to them, this last name of Baal appears to have been bestowed upon the prince of the devils; and later still, during the middle ages, to worship Baal signifies frequently, in the phraseology of Jewish writers, the practising of the rites of the Christian religion. Thus Rabbi Joseph Ben Joshua Ben Meir, in his "Chronicles," asserts that Clovis forsook his God and worshipped Baal, and that a high place was built at Paris for Baal Dionysius (*i.e.* the Cathedral of St. Denis).

BAAL'BEC or **BAL'BEC** (called by the Greeks *Helio-polis*, or the "City of the Sun") is an ancient city of Syria, now a mere village, but celebrated for the magnificence of its ruins. It is about 35 miles N.N.W. of Damascus, and 38 S.E. of Tripoli.

Baalbec signifies in the Syrian language the City of Baal, or the Sun; the Greeks, in changing it into Helio-polis, translated the Oriental name, which the Romans appear to have retained, until it was again changed into its original Syriac name Baalbec. See **BAAL**.

The city is pleasantly situated on a rising-ground near the north-east extremity of the plain of Boeat [Boeat is variously written—Bocat, Bekka, Bekka, Bquan, and Bokah], and immediately under the mountain-range called Anti-Libanus. This plain extends from Baalbec almost to the sea, in the direction of N.E. by N. to S.W. by S. Two rivers, the Litane and the Bardonni, flow through the plain of Baalbec, which is well supplied with water.

It is probable that the advantages arising from its commerce with Tyre, its connection with Palmyra, and the traffic with India, may have been the source of the ancient wealth of Baalbec, and the means of erecting those edifices

the wonderful ruins of which still exist. Those in front of the great temple were most probably designed for fora (markets or places of business), and are therefore provided with suitable shady porticoes and exhedræ, in which the merchants could conveniently transact their affairs. The history of the place itself is very obscure; but two Roman inscriptions of the time of Antoninus Pius show that it was then a place of some importance, under the name of Helio-polis.

At what time and by whom the city was first founded is wholly unknown. The style of the temples proves that they belong to the Roman period. Helio-polis appears to have been made a colonia by the Dictator Cæsar, and to have received the Jus Italicum from Septimius Severus (Dig. 50, tit. 1, s. 1). In 297 it became the scene of the martyrdom of Gelasius. The Emperor Constantine issued a rescript against the licentious rites of the inhabitants, and founded a basilica among them. On the accession of Julian the pagan population broke out into a violent persecution, and the city became notorious for its hostility to Christianity. Theodosius is said to have destroyed some of the temples, and to have converted the great temple into a Christian church. The names of some bishops and martyrs of Helio-polis appear in church history.

The area inclosed by the walls of Baalbec contains the great temple or Temple of the Sun, with its courts or fora; and the smaller temple, or perhaps basilica, which is in the best condition of all the buildings. There is also a very singular and unique circular temple, and a curious column, on the highest situation within the walls, which may possibly have been a clepsydra, or water-dial. The circuit of the city walls, according to the plan of Wood and Dawkins, is somewhat less than 4 miles.

The great temple appears to have been a peripteral pycnostyle temple, having ten columns in front and nineteen on the flank, the columns being 7 feet 10 inches in diameter, and 8 feet 1 inch apart, except in the centre intercolumniation of the portico. The length of the temple is near 290 feet, and the width 160. In its perfect state the height from the ground to the top of the pediment was 120 feet; the columns with the pedestals are 71 feet 6 inches high. The walls of the cella are restored by F. L. Cassas ("Voyage Pittoresque de la Syrie"), with an internal arrangement of columns. It appears that a certain Thevet, in 1550, saw twenty-seven columns of the great temple, and esteemed them the greatest wonders of Baalbec ("Cosmographie Universelle," l. 6, c. 14). Subsequent travellers mention only nine columns, with an entablature over them. Volney, in 1785, saw but six standing, and there are now only three. The shafts of these columns consist of three pieces, united so exactly that the blade of a knife cannot be inserted between the joints.

The smaller building, called by Mr. Wood "the more entire temple," but which appears in some respects to resemble an ancient basilica, is very near the large temple, but was built on a lower level, the bottom of the basement of the great temple being nearly as high as the top of the basement of the smaller edifice. The site of these buildings being very uneven, the basement on the south side is raised considerably with a solid foundation of large stones. This building is peripteral; the columns are also pycnostyle, and the portico is dipteral with a pseudo-intercolumniation before the antæ of the pronaos. We conjecture this building to have been a basilica, from the similarity of its internal arrangement to the basilica in the forum of Pompeii. It has, among other features of the basilica, the raised platform at the end, with the vaults below it and steps descending into them.

The circular building may be considered unique. Travelers have called it a temple. It is of the Corinthian order, with niches on the exterior of the cella, and decorated with twelve columns, eight of which form a dipteral portico,

which has a flight of twenty-one steps in front. From the two lateral columns of the portico commences the circular peristyle of the building. The entablature of the dipteral portico is carried in a straight line, and that of the peristyle is curved on the perpendicular face, and sweeps in an elegant line from column to column, the centre of the curved architrave being bedded on the circular wall of the building. This edifice is decorated in the interior with an Ionic order of columns, above which is another decoration, consisting of niches with pediments, and between each there is a single column with a small portion of an entablature over it. The roof was a dome probably open at the top, like the Pantheon at Rome. This building has been converted into a Greek church, called St. Barbe.

The order most frequently used throughout these buildings is the Corinthian. The Ionic occurs in the interior of the circular building only; and in the niches which decorate the interior of the fora, as well as in the building which we have called the basilica, the Composite is employed. The niches are decorated with columns and pediments, and form the principal feature of these edifices in their ruined state; they were intended for statues and busts, the pedestals for which still remain.

Without the walls there are also several ruins. The most remarkable is a Corinthian column in the plain, about 2 leagues from the city, and 1 from Mount Libanus, called Haroudiade; the shaft consists of fourteen stones, each about 3 feet thick (high), and stands on a base of five steps, 6 feet 8 inches high; on the north side there is a square compartment, probably for an inscription, but no traces of any now remain. To the south-east of the famous temple there are fragments of columns of red granite. There is also a Mohammedan sepulchre, of an octagonal form, to the south-east of the city, on the way to Damascus, the dome of which is supported by granite columns of the same kind, which were probably brought from the ruins to the south-east of the great temple. These columns are about 12 feet long and 5 feet in circumference; the granite is of a most beautiful kind, with large spots, and is finely polished. (Dr. Robinson's "Later Biblical Researches in Palestine," &c., London, 1856.)

The city walls appear to be a confused patchwork, put together in haste; with the rough stones are fragments of capitals, entablatures, and reversed Greek inscriptions. The walls are from 10 to 12 feet in height, with large square towers at intervals. The gates are also built in a rude style, with the exception of one on the north side, where there are the ruins of a large sub-basement, with pedestals and bases for four columns, in magnificent taste, and of a much higher antiquity. Both within and without the walls are confused heaps of rubbish, which appear to be the ruins of ancient buildings. In contemplating these ruins, we are struck by the immense size of the stones. Among others there are at least twenty of enormous dimensions. On the west side of the basement of the great temple even the second course is formed of stones which are from 29 to 87 feet long, and about 9 feet thick; under this, at the north-west angle, and about 20 feet from the ground, there are three stones which alone occupy 182 feet 9 inches in length, by about 12 feet thick; two are 60 feet, and the third 62 feet 9 inches in length. The material is a white granite, with large shining veins like gypsum. This stone abounds on the spot and in the adjacent mountains. Quarries have been opened in several places. In one called St. Elias there is still, among other stones of a vast size, one worked on three faces, which is nearly 70 feet long, and about 14 feet in thickness each way. The more ornamented parts of these buildings were carved out of a coarse white marble, which was brought from a more distant quarry west of the city.

When Wood and Dawkins visited Baalbec in 1751, only a small part of the city was inhabited, towards the south

and west, near the circular building. The houses are mean, with flat roofs, on which, during the summer months, the inhabitants often pass the night. A large portion of the space within the walls is entirely neglected, while a small part is employed for gardens. In 1751 the number of inhabitants amounted to about 5000, of whom a few were Greek and Maronite Christians, and some Jews, and all without trade and manufactures. The bad government of the emirs of the house of Harfouche, the earthquake of 1759, and the wars of the Emir Yousef and of Djezzar, had reduced the population to 1200 at the time Volney visited Baalbec in 1785. The ground immediately about the wall is rocky, and little advantage is taken of a command of water which might be usefully employed to irrigate the gardens. A little cotton, a small quantity of maize, and some water-melons, was all that the wretched inhabitants cultivated when Volney was there. Neither their condition nor their numbers has much improved since. Baalbec is now frequently visited by travellers from Europe and America.

BA'BA, a Turkish word meaning "father," and like the Italian *papa*, or English "dad-da" or "daddy," is an onomatopœic word derived from the earliest efforts of children to speak. Both in Turkey and Persia it is prefixed as a title of honour to the names of eminent ecclesiastics, more especially to those who devote themselves to an ascetic life, and also as a title of courtesy in other cases, as Ali Baba. The Hindustani word *bâ-bâ* or *baboo* literally means prince, but is used in ordinary life to signify the same as our English master or sir.

BA'BA, CAPE, is the *Cape Lectum* of the Greeks. It is a rocky bold headland, forming the most westerly point of Asia Minor, and is situated north-west of the northern extremity of the Gulf of Adramyti, the ancient *Adramittium*, and between the islands of Lesbos (now Mitylene) and Tenedos, which preserves its ancient name. The cape, which is scarcely 12 miles distant from the northern extremity of Lesbos, is in 39° 30' N. lat., and 26° E. lon. It is a shelving continuation or offshoot of Mount Ida, the numerous tops of which are to be seen in the distance. The whole line of coast from the head of the Gulf of Adramyttium to Cape Babà is very rocky and steep, and inland from the bleak cliffs there runs a continuous chain of mountains that gradually increase in elevation as they recede from the sea and approach the summits of Mount Ida. After the cape is fairly doubled the long level of the plain of Troy presents itself in striking contrast; for it is so flat and low that, when observed from a short distance at sea, it looks like a mere line nearly all the way from Cape Babà to the promontory of Sigium and the Hellespont. Projecting from Cape Babà there is a curious group of small islets, called anciently, from their number, Hecatonnesoi, or the Hundred Islands, but named by the modern Greeks Muskonisi. A small town called Babà stands on a shelving point of Cape Babà, immediately above the sea. Near it is the ruined city of *Assos*.

BAB'PAGE, CHARLES, celebrated as a mathematician and inventor, was born in 1792 at Teignmouth in Devonshire. He was educated at Trinity College, Cambridge, and took his degree of B.A. in 1814. In 1828 he was elected Lucasian professor in his own university, an office which he held until 1839. He stood unsuccessfully for the borough of Finsbury in 1832, but made no further effort to enter public life, though he took a prominent part in the foundation of the Astronomical and Statistical Societies. He died in 1871. He was the author of numerous works, among which were the editing, in company with Herschel and Peacock, the work of Lacroix on the "Differential and Integral Calculus" (1816); "On the Economy of Manufactures and Machinery" (1832); "Tables of Logarithms" (1834); and a ninth "Bridgewater Treatise." His principal invention was the famous calculating engine,

to which he devoted many years, spending on the work a considerable sum from his private fortune, in addition to the money allowed by the government. Designed at first as a *difference* engine, the ideas of the inventor enlarged as the work progressed, and while it was yet uncompleted he elaborated plans for an *analytical* engine to undertake any problem of addition, subtraction, multiplication, or division. The government, however, becoming alarmed at the expense, declined to grant any more aid, and the machine was never completed.

BABEL, TOWER OF. The familiar account of the building of this tower, as given in Genesis xi., was long one of the most obscure incidents in the early history of mankind. It seemed to be unsupported in its picturesque vagueness by any secular account, for even the Chaldean priest Berosus, who occupies the same position with regard to Babylonian antiquities that Manetho fills as to early Egypt, is not known to have mentioned it. We only have Berosus at second hand, it is true; but with so many quotations of his great work on Chaldean traditions as are given us by Polyhistor, Apollodorus, Abydenus, &c., it seems certainly unaccountable that so remarkable an occurrence should remain unnoticed if he had recorded it.

The discoveries of Mr. George Smith (who died at Aleppo in 1876 while engaged in his researches) include, however, an authentic Babylonian account of Babel. This is contained on a tablet or tile forming part of a complete record, and found at Nineveh, the ruined capital of Assyria. In their dearth of literature of their own the Assyrians took careful copies of the ancient records of their southern neighbour and parent state, Babylonia (or Chaldaea), and stored these in great libraries in Assyria, as will be found more fully described in the article BABYLONIA. Such a library existed at the quarter of ancient Nineveh now called Kouyunjik, and its books were tiles of burned clay, impressed while soft with the treasured records. These were frequently in three languages, sometimes in the sacred language of ancient Babylonia alone. The tablet of the Tower of Babel is much broken, only four columns of writing remaining out of six; and it was evidently preceded by at least one tablet, from internal evidence. It is not necessary to quote the entire translation, but the most important passages are the following:—

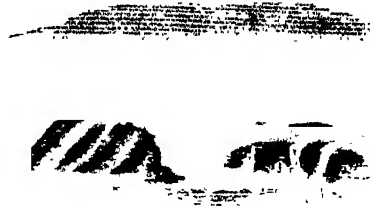
... them the father
... the thought of his heart was evil,
... he the Father of all the gods had repudiated.

... of Babylon He hastens to the submission,
Small and great He confounded the mound.
Their walls all the day they founded.
For their destruction in the night
He did not leave a remainder.

In His anger also secret counsel He poured out
... to confound their speech He set His face.
He gave the command, He made strange their counsel.
They weep hot tears for Babel ...
Bitterly they wept ...

Every one will re-echo Mr. Smith's quiet remark, "It is most unfortunate we have not the remainder of this tablet" ("Chaldean Account of Genesis," by George Smith, Lond.: second edition, Prof. Sayce, 1880). Enough still remains, however, to show that Babel was the name of the tower, that it was near Babylon, that it was considered a sacrilegious act to build it, that a king led his people into the sin, and that a great catastrophe resulted from it, according to the tradition. The Bible says "a plain in the land of Shinar" was the place, and this clearly points to the great Babylonian plain. The Babylonian habit of building with bricks is also carefully mentioned. The mode of destruction is not given in the Bible; but a Jewish tradition alleges that fire came down from heaven and burned it, while a Greek tradition, reported by Polyhistor, and supported by a tablet-fragment, points to a mighty wind as the agent which overwhelmed the great tower.

All the chief modern authorities (Smith, Rawlinson, Sayce, &c.) now agree that the great mound called Birs Nimroud, about 6 miles to the S.W. of Hillah, the modern town occupying the site of the heart of the monstrous ancient city, is the Tower of Babel. This is conjectured to be the place of the ancient Borsippa suburb of Babylon,



Birs Nimroud, the supposed Tower of Babel (conjecturally restored).

and the name Borsippa thus survives in "Birs." It will be seen, on reference to the article BABYLON, that the immense size of the city would quite allow this distance to be reasonable. The ruins are covered with huge mounds of rubbish, over which the winds of the desert have spread masses of fine earth and sand. Digging into the hill thus formed, Sir H. Rawlinson discovered seven stages of brickwork, resting on a platform of beaten earth, and of indeterminate height, each stage being of a different colour. The first stage is an exact square of 272 feet a side, the corners of it pointing due N., E., S., and W., the sides therefore pointing due N.E., S.E., S.W., and N.W.; and the bricks were blackened with bitumen, which is the substance called *slime* in Genesis. This may have been dedicated to the planet Saturn. The second stage is, like the first, square, and 26 feet high, but of only 230 feet to a side. It is not set evenly on the first, but is put back 30 feet from the front (N.E.) and only 12 feet from the back (S.W.) This is of orange-coloured bricks, and may have been dedicated to the planet Jupiter. Then comes a third square, again 42 feet less in side, but of the same height and similarly placed; the colour red, probably the part sacred to the planet Mars. The fourth stage has 146 feet square, but is only 15 feet high; it would be the Sun's stage, and Sir H. Rawlinson finds reason to believe it was plated with gold. The top is too ruinous to go further with accuracy, but the three succeeding stages are believed from their appearance to be respectively 104, 62, and 20 feet square, following the reduction with the same regularity as before. The ruin still rises 154 feet.

The sculptures in bas-relief at Nineveh show a great tower, forming part of a representation of Babylon; but this tower was of three stages, according to the bas-relief, with a great temple at the top. Such a discrepancy would seem fatal to the Borsippa site, did we not know that apart from the traditional overthrow of the tower, Sennacherib, the Assyrian king, when he conquered Babylon after a revolt, in 690 B.C., "pulled down," as he himself boastfully records, "dug up, and burned with fire the town and the palaces, root and branch, destroyed the fortress and the double wall, the temples of the gods and the towers of brick, and threw the rubbish into the Araxes, the river of Babylon." Therefore the upper part of Birs Nimroud is certainly due to Nebuchadnezzar, and is a part of the comparatively modern Babylon which that monarch made the wonder of the world about the year 600 B.C. The general view of Birs Nimroud is given by Rich as a great mound, "cloven on the eastern side by a deep furrow, and not more than 50 or 60 feet high there, but at the western side it rises from the plain in a conical figure to the elevation of 198 feet, and on its summit is a solid pile of brick

87 foot high by 28 in breadth, diminishing in thickness to the top, which is broken and irregular, and rent by a large fissure extending through a third of its height. It is perforated by small square holes disposed in rhomboids. The fine burned bricks of which it is built have inscriptions on them, and so excellent is the cement, which appears to be lime mortar, that it is impossible to extract one whole. The other parts of the summit of this hill are occupied by immense fragments of brickwork of no determinate figure, tumbled together and converted into solid vitrified masses, the layers of brick being perfectly discernible." Sir R. Ker Porter even goes so far as to trace in this the operation of lightning, the devastating effect of which, as he says, is now revealed by the destruction of the great temple of Bel, which formerly covered it over. It seems certain that the main part of Birs Nimroud was destroyed by fire, but whether this was the original lightning-stroke of tradition, or the vast conflagration planned by Sennacherib, must now remain uncertain. To sum up, we may say that there is nothing to contradict and much to support the notion that the Tower of Babel was erected at some unknown period of extreme antiquity, on the site now called Birs Nimroud, was overthrown in some stupendous storm, was rebuilt by the Babylonians in more solid fashion on the old foundation, was burned and partly ruined by the Assyrian Sennacherib in 690 B.C., and rebuilt to the summit by Nebuchadnezzar, king of Babylon, about a century later.

BAB-EL-MANDEB ("the Gate of Tears"), so called from its dangerous navigation, is the name of the straits by which the Red Sea is joined to the Indian Ocean. It is formed by two projecting angles of the Asiatic and African continents, or, more precisely, the two angles of Arabia and Abyssinia. Cape Bab-el-Mandeb ($12^{\circ} 40' N. lat.$), the ancient *Palindromis*, rises to a great height, and projects a long way from the mainland, which is here low, so that, when seen from a distance, it has the appearance of an island. The much more elevated land on the African side runs in a straight line. Opposite Cape Bab-el-Mandeb the coast of Abyssinia is distant upwards of 15 or 16 miles, and here both continents approach nearest one another and form the straits. Within the straits, but much nearer to the Arabian shores, is the island of Perim, on which the British have erected a lighthouse and fort. The strait to the east of this island is called the Little Strait, and that to the west of it the Large Strait. The Little Strait is most frequented by vessels, because its moderate depth allows anchorage, if circumstances render it necessary. The depth here varies from 9 to 14 fathoms. This strait is 4 miles wide, but contracted by shoal water extending from the Cape of Bab-el-Mandeb to a small island about a mile from it, called Pilot Islet. The island of Perim is rocky, low, and barren. On the S.W. side it has an opening into an excellent harbour or cove, which affords shelter against nearly every wind, and a good anchorage in from 4 to 6 or 7 fathoms water. The Large Strait is from 9 to 10 miles wide, and to the south of it, near the coast of Africa, are eight small islands, or rather rocks, called the Eight Brothers. In the midst of the strait the depth is more than 100 fathoms; but close to the Eight Brothers, along the coast of Abyssinia and near the island of Perim, the depth of the sea varies from 16 to 30 fathoms. The Eight Brothers are of moderate height, rocky, and barren.

BABER, with his complete name *Zehir-ud-din Muhammad Baber*, the celebrated founder of the Tartar, or, as it is usually called, the Mogul empire in Hindustan, was born in 1488. His father, Sultan Omar Sheikh Mirza, a great-great-grandson of the celebrated Timur or Tamerlane, was sovereign of Ferghana, a province situated on both sides of the river Sir, the *Jaxartes* of the ancients. Baber was in his twelfth year when his father died. The history of Baber's reign till the twenty-third year of his age is a continuous succession of vicissitudes, in which we

find him alternately conquering and losing Samarcand, Andijan, Khojend, and other places in or near his paternal dominions. In the year 1508 Sheibani Khan, a descendant of Gengis Khan, conquered not only Samarcand and Bokhara, but also the countries of Ferghana and Uratippa; and Baber quitted his native country and resolved to try his fortune in Khorasan. He succeeded in obtaining possession of Badakhshan, and made two irruptions into Hindustan.

In 1510 the death of his old enemy Sheibani Khan seemed to open to him a hope of recovering his dominions. In the succeeding year he gained possession of Hissar, Bokhara, and Samarcand; but an invasion, under the son of Sheibani Khan, brought him into imminent danger, and, unable to preserve his conquests, he retired to Cabul (probably in 1515).

In 1519 Baber undertook another expedition into Hindustan, and he was now successful, subduing the Punjab, Afghanistan, and Delhi. But his acquisitions from the Indus to the mouths of the Ganges were made so rapidly, and they comprehended so wide an extent of country, and so great a variety of population, that to cement them into a firm union would have required a much longer reign than what he himself was destined to enjoy. Even his son Humayun could but with difficulty maintain possession of these extensive territories; and it was not till the reign of Baber's grandson, Akbar, that a regular administration of the whole empire was established.

Baber died at the Charbagh, near Agra, 1530, and was succeeded by his son Hamayun. To his talents as a general and his foresight as a statesman (shown in his improvements of public roads, adjustment of taxation, &c.), Baber united a taste for science and art; and the memoir written by himself gives a high idea of his literary ability.

BABEUF, FRANÇOIS NOEL, better known by his self-bestowed surname Gracchus Babeuf, a French political writer and theorist, was born at St. Quentin in 1764, and was executed at Paris, 27th May, 1797. When the Revolution broke out he was one of its earliest and most devoted partisans, defending and propagating its principles in the *Correspondent Picard*, a journal published at Amiens. In these writings he was prosecuted, removed to Paris, and tried; but was acquitted 11th July, 1790. He was then appointed administrator of the Seine; dismissed soon after, but managed to procure a similar appointment at Montdidier. Here he was charged with forgery, fled to Paris, was arrested, and sent for trial before the tribunal of the Aisne, but was once more acquitted. In 1794 he returned to Paris and established a journal called the *Tribune of the People*, in which he preached the doctrine of absolute equality, and assailed fiercely the remains of the party of Robespierre. He was again arrested in 1795, but released shortly after; and then, in connection with some of the members of the extreme Jacobite party, with whom he had formed an alliance, he led a conspiracy for the re-establishment of the democratic constitution of 1793, which he hoped would be the first step towards the realizing his socialistic dream. The conspirators were betrayed to the government by one of their number, and arrested on the eve of the projected insurrection. They were at once placed on trial, and on the 26th of May Babeuf with his colleague Darthe were sentenced to death. On hearing the sentence they both stabbed themselves in the presence of their judges; but the wounds not proving mortal they were guillotined the next day. Babeuf was a man of determined character and intense enthusiasm, but of a weak and narrow mind, enslaved to his one impracticable idea of absolute equality among men. To this he was prepared to sacrifice, if necessary, all the arts of life and all the fruits of civilization: no one should possess property; and he even maintained that all should be dressed alike. His furious and reckless fanaticism, however, made

him an excellent tool in the hands of men of abler minds and different aims.

BABIANA, a genus of Cape plants belonging to the order Iridæ. It derives its singular name from *babianer*, by which the Dutch colonists call these plants, because their round subterranean stems are greedily eaten by baboons. It differs from *Gladolus* in its round leather-coated seeds, and in the flowers having the tube of *Ixia*, and from *Ixia* in their having the irregular limb of *Gladolus*. More than thirty species are known, among which are some of the finest of the Cape tuberous plants. The flowers of *Babiana* are yellow, purple, and even scarlet, of considerable size, and extremely handsome. They are produced in perfection, provided the plants are so cultivated as to be exposed abundantly to air, light, warmth, and moisture when in a state of growth, and preserved cool and dry while in a state of repose. These plants are found at the Cape of Good Hope.

BABINGTON, ANTONY, a Derbyshire gentleman, the leader of a conspiracy in favour of Mary Queen of Scots. He was a wealthy landed proprietor and a zealous Roman Catholic, and in connection with thirteen other Roman Catholic gentlemen endeavoured to bring about the murder of Queen Elizabeth and the liberation of Mary. The murder of Elizabeth was undertaken by an obscure fanatic named Savage, and the day fixed was 24th August, 1586. Babington, who had reserved for himself the rescue of Mary, entered into correspondence with her, and received in reply a letter apparently from her approving of the whole plot. But the secretary of Elizabeth, Walsingham, had been early informed of the conspiracy, and all the movements of the conspirators were revealed to him by his emissaries, who obtained admission by pretending to share in the plot, so that when all was ripe for action Babington and his accomplices were arrested, brought to trial, and condemned on their own confession. They were executed on 20th September, 1586. Four months afterwards Mary also suffered death, the principal charge against her being the letters received by Babington. Mary, however, denied until the last having written them, and her adherents maintained that they were forgeries contrived by Walsingham for the purpose of bringing about her destruction.

BABINGTON, WILLIAM, a distinguished physician, was born in 1756 at Portlengone, a village on the Ban, near Coleraine, in the north of Ireland. His father was a clergyman. Young Babington studied at Guy's Hospital, London, where, upon the occurrence of a vacancy in the office of apothecary, he was appointed to that office.

In 1797 he resigned his office at Guy's Hospital, and having obtained the degree of Doctor of Medicine, he commenced private practice as a physician in the city of London. Soon after he was elected one of the physicians to Guy's Hospital, where he had continued to lecture on chemistry. In 1799 he published his "New System of Mineralogy." From this time he rose rapidly in public estimation as a physician. From a friendly meeting of those interested in mineralogy, a favourite study of Babington's from his youth, at Dr. Babington's house, sprung the Geological Society. In 1822 he was elected president of the society, having been vice-president in 1810 and the three subsequent years. He enriched the museum and library with liberal donations, and the Transactions of the society contain several papers by him.

While his mornings were devoted to the practice of his profession, his evenings were dedicated to study, or social intercourse with individuals distinguished by their attainments or love of science. He was the personal friend of nearly all the most eminent scientific men of his day, by whom he was as highly appreciated as he was justly esteemed by the public as an exceedingly able and enlightened physician.

The Royal Society admitted him as one of its fellows,

and the Royal College of Physicians testified their sense of his character by electing him a fellow. During the prevalence of the fatal influenza in the spring of 1833, he zealously attended his patients, till at last, from exposure to the evening air after being present at a crowded scientific meeting, he was himself attacked by that disease, and on the 29th of May expired at his house in Devonshire Street, in the seventy-seventh year of his age, to the general regret not only of his numerous private friends, but of all the public scientific bodies to which he belonged.

BABOOL is the Indian name for *ACACIA arabica*.

BABOON is the name applied to the genus *Cynocephalus* (Gr. *kunocephalos*, dog-headed), belonging to the Simiædæ or monkey family. The neck is short and thick, and well adapted for the support of the huge head, the jaws and facial portion of which are enormously developed, so as to form a thick heavy truncated muzzle, at the end of which the nostrils open, as in the dog. This great enlargement of the muzzle detracts from the volume of the skull—the organs of mastication are developed to the prejudice of the brain and intellectual functions—while from the weight and anterior preponderance of the muzzle, and the position of the skull with respect to the spine, the muscles required for supporting the burden, and others inserted into the occipital bone, are not only necessarily developed, but are extensively attached to bold rugosities, or a bony occipital ridge. These animals usually go on all fours like a dog. They can scarcely assume, and not at all maintain an erect attitude; they are to a great degree terrestrial in their habits, taking up their abode in rocky and mountain districts rather than forests, except in the instance of one or two species. As a general rule, however, though they climb trees with facility, they prefer craggy rocks and precipices, among which they dwell in security. Of all the *Quadrumanæ*, the baboons are the most frightful; their eyes are fierce, scowling, and malicious, and beetled over by a strongly-marked superciliary ridge, which in concert with the swollen appearance of the superior maxillary bones, and the sudden fall and narrowness of the forehead, gives an expression of brutal ferocity. As these animals sit crouched up, gazing with mingled suspicion and hatred on all who approach them, they never fail to excite disgust and apprehension. Nor are these feelings lessened by the contemplation of their powerful frame. The shoulders are thick and massive; the chest, though narrow, is very deep; their limbs, more equal in comparative length than those of the Simiædæ generally, and especially of the oranges and gibbons, are extremely muscular; and the enormous size of the canine teeth, which remind us of those of the tiger, and which they are ever ready to display, only serve to complete a picture of malignity conjoined with courage and tremendous physical force.

During youth they are tolerably tractable, but as they become adult their playfulness is exchanged for moroseness, and their docility for distrust and maliciousness. A look or movement throws them into ungovernable transports of rage, in which they appear like infuriated demons, and woe to the person then in their power. Fatal accidents have resulted from want of caution.

In their wild state the baboons congregate in troops, and are bold and skilful in their predatory excursions. When forced to retreat the old males form a rear-guard, and cover the flight of the females and their young.

Their food consists of bulbous roots, fruits, berries, and grain, together with eggs, scorpions, insects, and reptiles; indeed, they are to a certain extent carnivorous, and in domestication relish cooked meat, and even devour raw flesh with avidity. They do not arrive at maturity till the seventh or eighth year of their age.

The baboons are in the main African; one species is found in Arabia, as well as in Abyssinia; some are peculiar to Western Africa, one to South Africa, and another to the

island of Celebes. All have large cheek pouches. The tail is short or moderate. The posterior molar of the upper jaw has a fifth tubercle. The callosities are large.

The common baboon (*Cynocephalus papio*) is very often brought to Europe, and its good temper, familiarity, and curious habits when young render it a great favourite with visitors to menageries. As it increases in age, however, it acquires the same repulsive habits as the other species, although perhaps in a somewhat less marked degree, and in some cases the adult males have been known to retain much of their youthful docility. It also exhibits great intelligence. With regard to the range of the common baboons, they have been found in Abyssinia, in Guinea, and throughout the west coast of Africa.

The general colour of this baboon is reddish-brown; the whiskers are light-fawn colour, the face nearly black, and the callosities reddish-violet. It is one of the Simiadae which supports the climate of Europe with least inconvenience, and it has frequently bred in our menageries. The adults, even the males, exhibit much attachment to the young animals, nursing them with great tenderness whilst they are very young, and treating them afterwards with far more kindness than is usually shown by monkeys in captivity towards their offspring.

The black baboon (*Cynocephalus niger*) is of great interest on account of its habitat, as it is the only true baboon not found in Africa. It is a native of the island of Celebes, and has been introduced into the Philippine Islands. It lives in forests and is arboreal in its habits. The head and limbs are clothed with a long thick black fur. The callosities are scarlet and the tail is very short.

For the other species of baboons see ANUBIS, CHACMA, DRILL, GELADA, MANDRILL, SPHINX, TIGRIS.

BABRIAS or **BABRIUS** (or even sometimes *Gabrias* is given as his name) wrote a collection of Æsopian fables in ten books, which he turned from prose into choliambic verse. The way in which Babrias was discovered is remarkable. The eminent scholar Bentley, in his "Dissertation on the Fables of Æsop," pointed out for the first time that the apparently prose fables (in the various collections handed down from the time of Maximus Planudes) really contained many complete verses in classical form, not quite accurate iambs, but "choliambics," or *halting iambs* (this being a literal translation of the word), that is, having a spondee as the last foot, a favourite device in satirical poems. Bentley suggested that these might be relics of the lost Babrias, whose metrical version had quite disappeared except for the critical notices in other ancient authors. Thus Avianus, in the preface to his fables, states that the fables of Babrias were contained in two volumes, by which he means rolls of papyrus. The ten books mentioned by Suidas were divisions of the fables themselves. Nothing is known of Babrias, and the exact time at which he lived is uncertain, though he may be certainly placed near (probably a little before) the age of Augustus. The fables of Babrias were used by the transcribers and *rédateurs* in the middle ages as the foundation of their versions of Æsopian fables. In some cases the copyist was fortunately content to transcribe, with only a few variations, the metrical original of Babrias as prose. A few fables have likewise been preserved accidentally in an entire form, and several fragments are cited in the Lexicon of Suidas. The language of Babrias is extremely terse and elegant, and his style of narration lively, pointed, and simple. The ingenuity of scholars was busy reconstructing a supposed Babrias until an unexpected modern discovery added to the number of the fables. Among the numerous MSS. which M. Mynas found in the convents of Greece, there was one containing the fables of Babrias in the convent of St. Laura on Mount Athos. He took a copy of it (the price which the monks asked for the original being too exorbitant), and brought it with the rest of his treasures to Paris in 1842. The Greek fables which were

thus rescued are 123; they are arranged in alphabetical order, that is, according to the initial letters of the fables, and the present collection does not go further down than the letter O. A considerable number of fables is therefore still wanting. The full number is understood to have been 160. In addition to the original French edition of 1844 by Boissonade Lachmann (Berlin, 1845), Sir G. Cornwall Lewis (Oxford, 1846) and Weise (Leipzig, 1855) have edited Babrias. A subsequent discovery of M. Mynas, of ninety-four more fables, was pronounced by the best scholars (Professor Conington, Sir G. C. Lewis, &c.) to be a forgery by some unknown scribe. All previous editions are superseded by the work of Mr. W. G. Rutherford, with notes of rare value and originality (London, 1883).

BABUYAN'S ISLANDS, a cluster of small islands and islets lying to the north of Luzon, the largest of the Philippines. Babuyan, the most northern of the cluster, is in 19° 43' N. lat., and 122° E. lon., and is about 25 miles in circumference; there are four others of about the same size. The inhabitants carry on trade with the Chinese, whom they supply with gold, wax, cassia, cocoa-nuts, rice, maize, and pepper. Iron of excellent quality abounds in them. These islands are among the most productive of the Philippines.

BABYLON (*Bab-illi*, "the gate of the gods"—whence *Hillah*), the greatest city the world has ever seen, was situated on the lower Euphrates, the river running through its midst. It was about in the centre of the great plain of BABYLONIA, and gave its name to that region. Its site will be found marked on the map of ASIA accompanying Vol. I.—the modern town of Hillah occupying what was once the heart of the city.

Babylon was by no means the earliest capital or centre of government of the ancient country now known by the name of BABYLONIA or Chaldea; Akkad was the chief city down to B.C. 2000, Ur from B.C. 2000, Karak (the Erech of the Bible) a century and a half later, Larsa in B.C. 1700, and Akkad for the second time a century later still. It was not till B.C. 1550 that a foreign conqueror, Hammurabi, definitely brought all the great plain under his power, and made Babylon his capital. Hammurabi may have been an Arab—the Chaldean historian, the priest Berosus, so describes him; but the terms Arab and foreigner were so often interchanged that the point must be considered doubtful. The word Babylon is a Semitic translation of the ancient Turanian name of the town, *Ca-dimurri*, which it bore under the primitive Akkadian dominion. Babylon enjoyed two centuries and a half of undisputed dominion, terminated in B.C. 1300 by an invasion from the more northerly kingdom of ASSYRIA, under a monarch whose name is sometimes read Tugultinip and sometimes Tiglath-Adar—probably two titles of different significations. After this conquest Babylon was subject to Assyria, but revolted from time to time. A siege by Shalmaneser in 851 B.C. reduced it to submission, but Sargon, B.C. 722, Sennacherib, B.C. 705, and Assurbanipal, B.C. 673 (the Sardanapalus of the Greeks), successively plundered it as opportunity offered. Sennacherib especially seemed to take a savage delight in ruining the great subject town (see the curious inscription of his quoted in the article BABYLON). Sardanapalus was the greatest of the Assyrian kings, but, as is so often the case, his personal greatness proved the destruction of the empire; and Nabopolassar, governor of Babylon under his weak successor, assisted by the King of Media (the country round the south shore of the Caspian), threw off the Assyrian yoke in B.C. 625, and Babylon, after seven centuries of oppression, was once more free. Not only was Assyria soon brought into subjection, but the city of Babylon itself grew in size and splendour at an astonishing rate. The name of Nebuchadnezzar, the son and successor of Nabopolassar, is very familiar to readers of the Bible, and he it

was who in a long reign of forty-two years—from B.C. 604 to B.C. 562—raised Babylon to a "wonder of the world." The outer wall is stated by Ctesias, an eye-witness, to have been 42 miles in circumference, and Strabo and Quintus Curtius support this measure. Herodotus says the outer wall measured 56 miles, and Pliny follows this measurement. The smallest of these dimensions would give a city of 100 square miles in area, that is, four times the size of London; and the largest, one of 200 square miles. There was an inner wall also, probably protecting the actual streets of the town; for the vast inclosure contained numerous fields and gardens, as well as dwellings, a practice still observed in the walled cities of Central Asia. This inner wall, although very much smaller than the outer *enceinte*, was still a structure of great length; and it will give some idea of the resources of the great King Nebuchadnezzar if the fact is mentioned, which he himself records in an inscription, that he built this inner wall in fifteen days. Herodotus describes the outer wall with his usual vivacity. It was of brick, cemented with hot bitumen; had 250 towers at irregular intervals; and was so thick that a four-horse chariot could be driven along its top, and could turn between the towers (Herodotus, book i.) It formed a gigantic square of 14 miles a side by Herodotus' calculation, and its height was 325 feet, with a thickness of 85 feet. It was pierced by a hundred brazen gates; and the inner walls which guarded the course of the river had twenty-five gates, giving access to as many main streets. The houses were frequently of three and four stories. Ferry boats gave plentiful communication across the river, in addition to a bridge of stone piers, across which planks were laid during the day time, and removed at night. The foundations of this bridge have been searched for, but hitherto without result. At each end of the bridge stood a vast palace. The clay for the huge wall came in great part from the no less huge excavation necessary to form a moat, surrounding the town, very wide, deep, and always full of water. Of this moat, up till the present date, no traces have been found.

Unlike Nineveh, which perished so early that the allusions of classical writers are to a city that had passed away, we have in the works of Herodotus, Ctesias, and others, the testimony of eye-witnesses to the greatness and splendour of Babylon, though neither of these saw it in its full tide of prosperity. Herodotus especially is never weary of extolling its magnificence. He tells us that in the centre of each division of the city was a circular space, in one of which (the eastern or never part) stood the chief of the two royal palaces, called "the admiration of mankind;" and in the other stood the famous Temple of Bel, or as he calls it, "Jupiter Belus," a somewhat pyramidal structure in the style of the Tower of Babel (see BABEL), in eight stages, the lowest of which was 200 yards each way. It contained immense golden images of the idol, 40 feet high, with tables and utensils of like colossal size, and of the same precious metal. This temple is identified with the great ruin of the mound Babil, about 950 yards east from the Euphrates, very much nearer the river than Birs Nimrud, the supposed site of Babel, which lies about 10 miles to the S.W. The bricks found on the Babil mound bear the mark of Nebuchadnezzar. On the eastern side were also the so-called hanging gardens of Semiramis, which stood within the precincts of the great palace. Really these gardens were commenced by Nabopolassar and completed by Nebuchadnezzar; and the mythical Semiramis, if she ever existed, had nothing to do with them. A detailed account of them is given by Diodorus. They formed a square of 400 Greek feet, at a height of 75 feet, borne up by many tiers of arches built on one another. The surface was planted with rare trees and shrubs, some of the former being of immense size; and the gardens were supplied with water from the Euphrates by means of a

screw. Beautiful chambers were reared among the open arches. The ruin called *El Kasr*, or "the Palace," has been discovered to be the famous palace of Nebuchadnezzar. It stands on a mound about 700 yards long and 600 broad, with a height of over 70 feet. It is a very remarkable structure, and from its being uncovered and in part detached from the rubbish, is visible from a considerable distance, but so surprisingly fresh in appearance that it was only after a minute inspection that Mr. Rich was satisfied of its being in reality a Babylonian remain. "It consists of



North face of El Kasr, from Rich's Memoir on Babylon.

several walls and piers, which face the cardinal points, 8 feet in thickness; in some places ornamented with niches, and in others strengthened by pilasters and buttresses, built of fine burned brick still perfectly clean and sharp, laid in lime-cement of such tenacity that it is almost impossible to extract a brick whole. The tops of these walls are broken, and may have been much higher; on the outside they have in some places been cleared nearly to the foundations; but the internal spaces formed by them are yet filled with rubbish, in some parts almost to their summit. One part of the wall has been split into three parts and overthrown, as if by an earthquake. Some detached walls of the same kind, standing at different distances, show what remains to have been only a small part of the original fabric; indeed it appears that the passage in the ravine, together with the wall which crosses its upper end, were connected with it. Near this ruin is a heap of rubbish, the sides of which are curiously streaked by the alternation of its materials; the chief part of which it is probable was unburned bricks, as some were found here."

The wall of inclosure of El Kasr, Diodorus assures us, was 7 miles in circuit; really it was a city within a city, probably offering an inner line of resistance in case of siege. The king's palace at Delhi served a similar purpose, it will be remembered, in the Indian mutiny of 1857.

These three great mounds—El Kasr, the ruin of the great palace; Babil or Mujellibe, the relics of the mighty Temple of Bel; and Amram, believed to have been a ruin even in the time of Nebuchadnezzar, and conjectured to be a palace of the early kings before even Assyria yet existed, give a peculiar and striking physiognomy to the left bank, the eastern side, of the Euphrates even to this day. They are hills of bricks, broken and whole, covered with their own decay and with the sand of the desert, furrowed with the fissures of time and with the quarries of the spoilers, who have built villages and towns from their substance—a remarkable and melancholy contrast to their ancient magnificence.

A great reservoir, partly natural, surrounded by sandstone cliffs, partly excavated, of the enormous dimension of 40 feet square, lay west of Babylon. Into this the waters of the Euphrates were first conducted by the "river of Babylon," the Araxes, when the bed of the river was lined with bricks. Thence the Araxes flowed through a deep valley (*wady*) into Arabia, fertilizing the country with irrigation as it went. Reservoir and river have now alike disappeared.

Returning to complete the history of Babylon, it remains

now briefly to indicate its decay—no less rapid than its rise. Nebuchadnezzar and his Median ally made both countries one great joint dominion, but after only three disturbed reigns the sceptre of Babylon passed to a new family, and that of Media was seized from the weak hands of Astyages the Mede by his grandson, Cyrus the Persian. Alarmed at the rapid growth of the new power, Nabonahid, king of Babylon, joined Croesus, king of Lydia, against Cyrus; but the latter was tempted to engage singly and was overthrown, and the former, in a subsequent campaign, fell into the hands of the conqueror, from the circumstance of large bodies of his soldiers rather welcoming the Persians, with their pure monotheistic religion, as deliverers, than fighting them as invaders—for it must be remembered that these disaffected soldiers were the captive Jews. Meanwhile Belshazzar, son of the monarch, sustained a siege in Babylon until Cyrus diverted the Euphrates and entered the city by the river-bed, *B.C.* 538. The Jews were allowed to return to Palestine. The King of Babylon was not ill treated, and died in an honourable captivity. Later, during the troubles at the death of Cambyses, a Babylonian impostor appeared claiming the crown as being Nebuchadnezzar, the son of Nabonahid. Belshazzar perished in the assault of the city. Cyrus did no harm to the city after his victory, but made it the royal winter residence and the third capital town of his kingdom, after Susa and Ecbatana. But in consequence of a revolt under Darius I. the walls and gateways of the city were broken down, and the city was treated very severely. The population soon decreased in such a degree that a number of women had to be brought in from the neighbouring country. Xerxes, later still, carried away the golden statue of Belus, and when the city was taken by Alexander the Great he found the temple of that deity in ruins. Alexander promised the inhabitants to restore that building, but though he employed 10,000 men for two months they were unable even to clear away the rubbish. The river that had been diverted by Cyrus had never been properly embanked again, and the country around had gradually become marshy and pestilential. These marshes indeed cost Alexander his life. The founding of Seleucia by Seleucus Nicator further contributed to its downfall, for the ruins of Babylon became the sources from which the materials were brought for building the new city. In the time of Diodorus and Strabo corn was grown amongst the ruins of the city within its ancient precincts. The district ultimately became almost deserted, and the ruins were quarried for the benefit of Hillah, Kifir, and other Arab towns. The Arabs took possession of the province *A.D.* 650, and finally the great city, "the beauty of the Chaldees' excellency," became a mere collection of desolate heaps, and was avoided even by the wandering tribes of that country as a place haunted by evil spirits.

In their pictorial representations the men of Babylon are delineated as wearing long hair confined by their turbans, and as cultivating a full beard. The kings, rulers, and priests are distinguished by their elaborate robes and ornaments. The dress of the better class appears to have consisted of a loose robe of linen reaching down to the feet, covered by a woollen tunic, over which a short cloak or cape was worn. The poorer classes appear to have been content with a single loose garment, confined at the waist by a belt or girdle.

The ruins of Babylon have been frequently visited and partially explored by travellers, but though much of value has been recovered it is certain that there are vast treasures in the shape of historical and traditional records still waiting for their discoverer, buried beneath the mighty mounds of rubbish. A general account of the whole country, of which Babylon was the centre, is given in

BABYLONIA.

BABYLONIA. If one follows on the map of ASIA

the course of the two great rivers Euphrates and Tigris, they are found to rise in the mountains of Armenia, and quickly diverging to about 200 miles apart to inclose a large plain of oblong outline between their fairly parallel courses. About midway in the length of the Tigris the rivers approach, and that so nearly as to be about 20 miles apart only at one point, and to continue less than 50 miles apart for some distance, then widening considerably so as to produce a vase-shaped figure, a second plain about 200 miles in length is inclosed by them before they join, and pour their united flood into the Persian Gulf. This vase-shaped alluvial low-lying plain, with its continuation along both sides of the Euphrates to the sea, was the theatre of one of the oldest civilizations of the world, whose historical records go back to times coeval with the beginning of Egypt or of China, whose claims to be the site of Paradise itself are great, which undoubtedly still exhibits the ruins of the Tower of Babel, whose libraries contain the written legends whence the accounts of Genesis as to the world's early history may have been compiled, and whence Abraham came forth from "Ur of the Chaldees" (*Gen.* xi. 31), the modern Mugheir, to found the race of Israel. The upper plain whereof we have spoken was hilly and somewhat stony in parts, but fertile nevertheless; it afterwards bore the Greek name of Mesopotamia, "the country between the rivers." Eastward of this—that is, on the banks of the Tigris, and particularly east of that river—lay a very fertile district continuing this elevated plain, and these low hills of stone, which came to be called Assyria. South of these countries lay the vase-shaped plain of Babylonia, and by the sea-coast the Chaldeans retained an early independence. Still by the sea-coast and eastward the land was called Shushan; above Shushan lay Elam; and further north, up to the southern shore of the Caspian, was Media—Elam and Media bounding Assyria to the east, separated from it by the mountain chain of Zagros. Both Media and Assyria were bounded to the north by Niphates, Ararat, and the other mountains of Armenia.

It is from the plain of Babylonia that comes our civilization; and hence the elements of art, of knowledge, and of industry were first carried to Europe. It is difficult to realize that the half-desert countries watered by the Tigris and Euphrates were once the seats of advanced culture and centres of prosperous trade. The now barren plains of Mesopotamia were clothed with forests as late as the age of the Emperor Julian, whose army marched through the entire district, "one continuous sweep of verdure." The pestilential marshes of Babylonia teemed with rich and thickly-populated cities in the days of Abraham. Their former state of prosperity is the best assurance we can have of its revival with proper care and labour; we need not despair of seeing Babylonia again the granary of half the world, or Mesopotamia the highroad of enterprising commerce, if only we realize how great was the civilization which they once initiated and possessed, the nature and extent of which are but just beginning to be revealed to us, thanks to the zeal of a small band of scholars. Those who bestow a glance of wonder or curiosity at the Assyrian bas-reliefs in the British Museum, have for the most part little idea of the multitudinous monuments of an extinct but advanced civilization which lie locked up in the cases about them in the shape of small inscribed tablets of clay. These tablets constituted the larger part of the literature of the Babylonians and Assyrians, and it is through them that the early history of Western Asia and of the men that formed it has been read and analyzed. The daily life and manners of the great empires of the ancient East lie spread out before us with all the habits and beliefs, the science, the art, and the theology which characterized them. We are brought face to face with men who have hitherto been but names on the pages of Scripture—with Sennacherib, with Tiglath-Pileser, with Nebuchadnezzar, nay, with

errs at all he errs on the side of moderation (see *Transactions of Soc. Bibl. Archaeology*, November, 1882).

The question of the continued diversity of language will be dealt with later on, but the nations themselves became fused into one stock. The lowland Sumir, the highland Akkad, and the Semitic mountaineers of Elam became one indistinguishable people. The oldest towns have Akkad names, however, through all Babylonian history.

About B.C. 2250 a great king consolidated Chaldaea or Babylonia (often called Shinar also in the Bible) into one whole. This king's name is undecipherable, and scholars generally call him by a coined name, Isdubar; but the keenest students detect reasons for the name-symbols sounding like Nimrod, and of course any data leading to the discovery of the sounds of these symbols are eagerly desired. Professor Sayce finds reason for the sound "Kibirra." But apart from the name, the king of B.C. 2250 is undoubtedly Nimrod. He is the builder of Babel (as was Nimrod, according to the Jewish tradition), the founder of Babylon, as well as of Nineveh and Assyria (Gen. x. 11, 12, margin, "he went forth to Assyria"), the lord of Erech, a mighty hunter, &c. Nimrod (Isdubar) drove out the Elamite kings and re-established the Chaldean rule over the united nation. It may be mentioned that Aristotle had copies of astronomical observations sent him from Babylon, in the time of Alexander the Great, which reached back 1903 years, i.e. to the date 2284 B.C., and this is only one of half a dozen proofs as to the date of Nimrod, accepting the tradition that he was the founder of Babylon.

About 2000 B.C. Abram (Abraham) migrated to Syria, and thence to Palestine (Gen. xi.) This was the period of the great creative literary period of Babylonia, lasting about 500 years, up till 1500 B.C., i.e. to about the era of Moses. Babylon was not the capital at this time, but Akkad, a town situated on the Euphrates, in the "neck of the vase," where the rivers run closest.

With B.C. 2000 begins the era of Urnkh, king of "Ur of the Chaldees," Abraham's city, and the rise of Sumir, the southern part of the country, the metropolis being the city Ur, not far from the junction of the Euphrates with the Tigris.

B.C. 1850. Era of Isnidagan, king of Erech, a little north of Ur. Erech the metropolis.

B.C. 1700. Larsa the metropolis.

B.C. 1600. Era of Sargon, king of Agane and Akkad; revival of the power of Akkad.

B.C. 1550. Era of Hammurabi; rise of Babylon to be the metropolis.

The Sargon mentioned here must not be confused with his namesake of B.C. 722. He was the Moses of the Babylonians, born of an unknown father, placed by his supposed mother, a princess, in an ark of rushes, launched on the river, and saved and brought up by a ferryman. In his character as patron of literature Sargon resembles Solomon, and to him (as to Solomon) are ascribed the authorship or compilation of many books of the wisdom of ancient Babylonia.

The conquest by the Semite Hammurabi restored the Semitic sway from the westward, where the Semitic nation had taken root and flourished; its old eastern home, Elam, being now occupied by Turanians and by the advance guard of the Aryans. The Semitic language, largely mixed with Turanian elements from the primitive Akkadian, became the language of the country, forming a dialect rather akin to Phœnician than to Hebrew. A Semitic inscription of King Hammurabi himself is in the Louvre.

In 1278 Assyria, the warlike nation of the north, bearing to the more peaceful and studious Babylonians somewhat the relation of the Romans to the later Greeks, not only asserted its independence under Tiglath-ninip (otherwise called Tiglath-Adar), but reduced Babylonia to the condition of a tributary power, sometimes even to that of a province.

Babylon proved a troublesome subject, and made continual struggles for independence.

The supremacy in Western Asia now passed to Assyria, and we supplement what has been already stated in that sketch by a brief account of the kings who next ruled over the combined peoples.

Tiglath-Pileser I. (the name means "lord of the Tigris") is the principal monarch of this early empire of Assyria; his arms subdued the whole land from the Caspian to the Persian Gulf, and from the Mediterranean to the desert, yet he was defeated by the half-subdued Babylonians, who rose against him 1110 B.C. At his death the great dominion he had founded fell to pieces, and Babylonia was able again for about three centuries to contend for mastery with occasional success. In 885 Assur-nazir-pal restored the waning fortunes of Assyria, and under him the empire even exceeded in size that of Tiglath-Pileser, whilst sculpture and architecture reached an excellence hitherto unknown. In 860 his son Shalmaneser succeeded, and still further enlarged the kingdom, taking an opportunity to reconquer Babylonia amongst other feats of arms. It is this king who defeated first Benhadad, king of Syria, and afterwards his successor and murderer Hazael (2 Kings viii., &c.), B.C. 884. It was against Shalmaneser that Ahab fought (1 Kings xx.), and later on Jehu, son of Omri, king of Samaria ("Jahna, son of Khunri," on the obelisk recording it), from whom he extorted tribute. Jehu really was son of Jehoshaphat, and had endeavoured to extirpate the race of Omri (see Kings); it is curious that he had deceived the Assyrians into believing him the legitimate successor.

This first Assyrian empire was overthrown by Tiglath-Pileser II., a usurper, in a long and fierce struggle, ending in 744. Babylon, who had kept her independence, though often conquered by Assyria, was by this new conqueror reduced to a mere province, and remained in that forlorn condition, except from 727 to 710, until the time of Nabopolassar, the father of Nebuchadnezzar. Tiglath-Pileser organized the whole vast dominion by the system of satrapies, so well known later on under the Persian monarchy; and where populations were turbulent he had them transported to other regions in a mass. He placed Hoshea on the throne of Samaria, and made Uzziah of Judah his tributary, whilst on the other side one of his expeditions penetrated to India. In 727 Tiglath-Pileser II. was defeated and slain by a rival who took the name of Shalmaneser IV., and who is best known by his long campaign against Samaria, 2 Kings xvii. [See BABYLONIAN CAPTIVITY.] His successor Sargon—not to be confused with Sargon of Agane (the Babylonian Moses)—succeeded in capturing Samaria and in carrying away the ten tribes of Israel captive to Assyria (721 B.C.) Sargon's reign was a very brilliant one. Elam on the east, Armenia on the north, Syria and Palestine on the west, and lastly Egypt itself, successively fell under his irresistible attack; and from the last-named country he sailed to Cyprus, where his effigy found at Idalion bears witness to this day of his supremacy. Babylonia had seized the opportunity of the confusion at Tiglath-Pileser's death to rise under a Chaldean prince called Merodach Baladan (mentioned in 2 Kings xx., and Isaiah xxxix.), and had eventually regained complete independence and friendship with Hezekiah of Judah (B.C. 722); this too gave Sargon but one triumph the more, and in 710 he crushed the twelve-years-old kingdom and assumed the title of King of Assyria and Babylon, which Tiglath-Pileser before him had borne for the first time. Towns, palaces, and libraries began to arise as the king's energies turned to more peaceful occupations, his conquests exhausted; but his life was cut short by the usual violent termination of those times. After his murder his no less famous son Sennacherib ascended the throne of the united countries (B.C. 705).

Sennacherib is familiar to readers of the Old Testament from his invasion of Judah in B.C. 701, only frustrated by the check he received from the armies of Egypt and Ethiopia. For his campaign against Babylon, see BABEL. He too perished by murder in 681, at the hands of his own sons (2 Kings xx.); but his favourite son and chief-general Esarhaddon was able to become his successor, after a struggle with his brothers. Sennacherib had built largely at Nineveh; Esarhaddon preferred Babylon. He was a very bold warrior; and it was in one of the campaigns under Esarhaddon that the almost unequalled march of 980 miles into the heart of Arabia was performed by the Assyrian soldiers, 280 miles being through the desert. The Caspian tribes, the Caucasus, and Media (by this time fully Aryan in nationality) owned the sway of Esarhaddon, whose final achievement was the conquest and subjection of Egypt, and the consolidation of the whole western civilized world under one dominion for at least twenty years. Manasseh was brought captive to him at Babylon (2 Chron. xxxiii.), and Assurbanipal (the Sardanapalus of the Greeks) succeeded him (B.C. 667).

Assurbanipal was the most glorious prince of these times of high antiquity. He ruled over the wealthiest kingdom ever seen, extending its power from the Egean Sea to the Indian Ocean. So heterogeneous an empire could not long remain unattacked; and accordingly we find Assurbanipal in great peril by a combined rising of Elam and Media on the east, Babylonia, Arabia, and Egypt on the south, King Gyges of Lydia and the kings of Palestine on the west. Of all these, however, Egypt, aided by Gyges, alone regained independence. Babylon suffered most severely after its reduction by famine. This danger over, Assurbanipal's magnificence was fully displayed, the great library at Nineveh became the wonder of the world, learned men of all nations poured into Assyria; the palaces were more grand than ever, gorgeous with gold and silver, precious hangings, and walls sculptured in bas relief.

This splendour vanished before it was fully realized—for at the death of Assurbanipal, the viceroy of the conquered Babylonia, Nabopolassar, threw aside his loyalty and declared himself king, B.C. 625. Not only did he achieve complete independence for Babylon once more, but gaining the help of Media he assaulted and took Nineveh, and the last Assyrian king, Sardanapalus, who is known to us in Byron's poem as Sardanapalus II., perished in the flames of his palace, to which his own hand had set fire.

As at the beginning of this long chapter of the world's history in 2450 B.C., so now till its close in 538, did Babylonia rule the world of Western Asia. In 604 Nebuchadnezzar succeeded his father Nabopolassar, and Babylon rose to the loftiest point ever attained by any city. [See BABYLON.] The long reign of forty-two years gave prosperity to the country, the old enemy Egypt was quite subdued, and the world seemed to have found its master. Hardly was the great king dead, however, than within six years the empire tottered, and the crown was seized by the usurper Nabonahid from the grasp of his feeble descendants. Cyrus, the king of Persia, saw the weakness of the kingdom, and used his opportunity. The conquest of Babylonia was effected, and the supremacy over Western Asia transferred to Persia, B.C. 538.

Babylonia was no quieter under the ancient Persians than under the Assyrians, and the great city was more than once besieged in the quelling of the revolts which fruitlessly beat against the Persian power. This at last itself fell before Alexander the Great, who found his death in Babylon B.C. 323, probably from fever caught in the marshes, possibly from excess in living, possibly from poison. Seleucus, one of Alexander's generals, claimed and won it at the partition of the empire, and it was the fairest part of the great realm of Syria. In B.C. 140 it

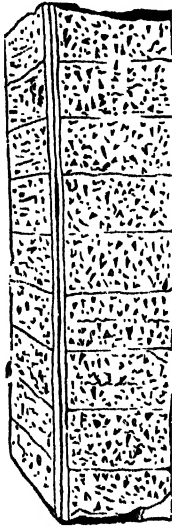
formed part of Parthia, and so remained till it was overrun by the Romans in their expeditions against that nation in the second century A.D., and by Julian in the march spoken of above, 363 A.D. Finally the caliphs seized it from the Sassanides in the year 650; and Bagdad on the Tigris, not far from Babylon on the Euphrates, was the seat of the Mohammedan empire for six centuries. Conquered and reconquered by Persia and by Turkey, it has been for the last 250 years under Turkish rule.

It will be perhaps remarked that nothing has been said of Semiramis. The reason is that although Greek historians give very full and circumstantial accounts of her foundation of Nineveh, and her exploits in war, with armies numbered by the million and fleets by the thousand, yet the records of Assyria are absolutely silent as to Semiramis, and the dates and facts given about her for the most part conflict with the records of history. It seems proved, therefore, that these tales are fictitious.

Literature.—At an early period in Babylonian history a great literary development took place, and numerous works were produced which embodied the prevailing myths, religion, and science of that day. Written many of them in a noble style of poetry (as we are assured by Mr. George Smith, who gave his life to Babylonian research), and appealing to the strongest feelings of the people on one side, or registering the highest efforts of their science on the other, these texts became the standards for Babylonian literature, and later generations were content to copy these writings instead of making new ones for themselves. In fact every great Babylonian city had at least one library filled with such copies written on clay, or more rarely, on papyrus. Clay was everywhere abundant; and by the veneration in which they were held, these texts fixed and stereotyped the language of histories and inscriptions down to the Persian conquest (B.C. 538). Thus texts of Nim Agu, Sargon, and Hammurabi, a thousand years before Nebuchadnezzar, are in the same language as his own!

Not so with the speech of the people. The private letters discovered show an entirely changed language. It is as with ourselves. The language of the Bible is not yet three centuries older than our common speech, but it already presents great diversities; how, then, when it shall be twelve? The tablets containing these ancient copies of almost inconceivably ancient originals vary from an inch square to over a foot, and are composed of fine clay inscribed with cuneiform characters when in a soft state, then baked in a furnace until hard, and afterwards transferred to the library. Sometimes clay cylinders are used (see illustration on next page). When Nineveh was destroyed by fire, B.C. 625, at the time of the new birth of the supremacy of Babylon, many of these tablets were cracked and scorched by the heat; they have been further broken by being turned over by hunters for treasure; and, to complete their ruin, the rain of that day and ours alike, soaking through the ground, has every spring saturated them with mineral-impregnated water and chemical substances, which leave crystals in every crack, whose growth splits the tablets to minute fragments. Many tablets are in 100 pieces, and the labour of bringing together the scattered portions is not the least part of the work done by our archaeologists. Every tablet is numbered and bears the first line of the entire work. Thus the great astrological work begins, "When the Gods Anu, Elu," &c., and each tablet bears a corresponding mark, "First tablet of When the Gods Anu, Elu," &c., "Second tablet of When the Gods Anu, Elu," &c., as well as concluding with the opening words of the next succeeding tablet. There were over 10,000 tablets at Nineveh, by far the greatest number copies of Babylonian texts 1000 years old at that date. Almost all that we know of ancient Babylonia and Assyria is derived from the contents of a single Assyrian library—that of Nineveh, about two-thirds of which is now in the British

Museum. This library was established by Assurbanipal, distinguished among Assyrian kings by his patronage of learning. The earlier libraries of Assyria, as well as those of Babylon, were despoiled for its sake, and scribes were



Hexagonal Burnt-clay Cylinder, from Kouyunjik, containing part of the records of Sennacherib, now in British Museum.

kept busily employed in copying and re-editing the old literature of Chaldean. This was in 673 B.C.

The contents of a Babylonian library, judging from those of the library of Nineveh, must have been very various. The Rev. Professor Sayce, whose book on "Babylonian Literature" (Lon. 1880) gives a popular account of them, describes them as comprising "historical and mythological documents, religious records, legal, geographical, astronomical, and astrological treatises; poetical compositions, grammatical and lexical disquisitions, lists of stones and trees, of birds and beasts, copies of treaties, of commercial transactions, of correspondence, of petitions to the king, and of royal proclamations." Two of the smaller tablets brought from Nineveh may be noted as especially curious, one as containing the private will of Sennacherib, in which he leaves certain valuables to his favourite son Esarhaddon, and the other as giving a lesson in spelling and pronunciation to one of the princesses. Equally worthy of notice are the copies of despatches sent by generals in the field, and the fortnightly reports regularly forwarded to the king by the astronomers—royal attached to the observatories of the large towns.

The library of Nineveh was particularly rich in historical, religious, and scientific literature. Among the historical documents must be counted the so-called Assyrian Canon, by means of which the chronology, not only of the Assyrian monarchs, but also of the contemporaneous Jewish and Israelitish kings, has been restored. Thus we find that Ahab was living in the year 854 B.C., when he shared in the defeat suffered by Benhadad of Damascus at the hands of the Assyrians in the battle of Arer, that Jehu sent tribute to Nineveh in 842 B.C., that Uzziah of Judah leagued himself with Hamath in 742 B.C., that Tiglath-Pileser received tribute from Menahem in 738 B.C., and from Ahaz, or, as he is called on the Assyrian monuments, Jehoahaz, in 734 B.C., and that Sennacherib's campaign against Hezekiah took place in 701 B.C. It is of the highest importance to the biblical student to have at last a

trustworthy authority by which to rectify the conflicting numbers of the Second Book of Kings.

The most important of the ancient libraries was that of the king Sargon (the Babylonian "Moses") at Agane, the modern Sopharvaim, 30 miles above Babylon, on the Euphrates, collected in the year 1600 B.C. Under the last, or neo-Babylonian dynasty, Nebuchadnezzar raised up a library at Babylon, on the same gigantic scale as all the rest of his work there; but it is not probable that this library will be found to contain many original texts. On the other hand it is known that, after the Assyrian plan, Nebuchadnezzar caused the ancient texts of Agane and elsewhere to be copied for Babylon, and the mounds of Babylon only wait another Layard to excavate them, and another Smith to read the fragments so collected, to yield the treasures of Nineveh.

In 1881 Mr. Rassan, working for the authorities of the British Museum, examined the library at Sippara, with 10,000 tablets all perfect, and lying on the shelves in their original position as placed there by the librarians twenty-five centuries ago. These tablets were placed in the hands of patient students, the slow but gradual result of whose labours continually adds to our knowledge.

Religion.—The first Babylonian faith was undoubtedly Shamanistic; that is to say, good and evil spirits were detected in every natural occurrence and object, and influence might be gained over or through them by *magi*. The Semitic occupation brought nature-worship with it, and the spirits of the older faith became gods, and soon were arranged into an ordered hierarchy. A passionate outburst of hymns followed, all in the Akkadian tongue, fortunately preserved to us by copies, with either side-by-side or interlinear translations into ordinary Assyrian, so that the ancient Turanian tongue can be by their means deciphered. Many of these are highly poetical in character, and all are extremely valuable. The creation, the innocence and fall of man, the Deluge, the deeds of Niurad, the Tower of Babel, the sacrifice of Isaac, &c., all find their expression in texts of the time of Abraham, and in a language which was a dead language after 1600 B.C. Some of the penitential psalms are compared by enthusiastic students to the Psalms of David.

Bel (the lord) was the head of this Olympus—Anu, Ilea, and Elu forming a trinity beneath him, with a trinity of secondary gods, the Moon-god, the Sun-god (inferior to the Moon-god in the view of the Chaldeans) and the Air-god beneath them. These were the "seven magnificent deities"—the gods of the five planets making up the number of twelve. Innumerable lesser gods, angels, and demons were fancied as existing subject to these lords of heaven. Later times saw Bel worshipped so exclusively that the transition to monotheism, first that of Zoroaster and then that of Mohammed, has been made easy. The goddess Ishtar (Ashtoreth) was with the Babylonians the deity of love and also the deity of the planet Venus; so Bel, who answers to the Latin Jupiter, father of gods, was the deity of the star we call by that name. The national religion was prescribed and supported by the government, the various temples being endowed with large tracts of land, some curious records of which have been recently unearthed from the ruins. The services of the temples and the care of education appear to have been intrusted to a caste or order called the Chaldees or Chaldeans. The order does not appear to have been hereditary, but to have been recruited from the body of the people, and even according to the book of Daniel from the foreign captives or settlers in the land.

Science.—If we turn from religion and mythology to the domain of science, we shall find that here too the intellectual activity of the Babylonians had been excited. The belief of classical writers that Chaldaea was the birthplace of astronomy and astrology has been confirmed by the

disclosures of the cuneiform inscriptions, the scientific terms being nearly all Turanian, not Semitic; that is, older than 2000 B.C., and a remnant of the ancient Akkadians. The motions of the heavenly bodies and the phenomena of the weather were observed and noted down from a very remote period. Eclipses of both sun and moon were predicted, and a fancied connection had been detected between the weather and the changes of the moon, supported by centuries of observations. They knew the length of the solar year, prepared tables of lunar longitudes, numbered and named the visible stars, studied the comets, knew the pole-star, observed the motions of Venus and Mars, &c., and they discovered the first complex cycle of recurrence of any astronomical phenomena in their period of eighteen years, which they called Saros. They knew seven bodies—the sun, the moon, and five planets—which had irregular motions amongst the stars; and these seven they took as presiding deities, each over one day. Thus they invented a week of seven days, the names of which, translated into the Teutonic Sun-day, Moon-day, still remain, planet for planet. The seventh-day Sabbath indeed was kept as a day of rest with almost Jewish severity; on it the king was forbidden to eat cooked fruit or meat, to change his clothes or wear white robes, to drive his chariot, to sit in judgment, to review his troops, or even to take medicine. Something like an accurate measurement of time was attained by the invention of the water-clock and sun-dial, and it is to the Akkadians that we owe the division of the year by the signs of the Zodiac. It is possible that a rude kind of telescope was known, since one of the astronomical reports states that “Venus rises and its orbit duly grows in size,” and Sir A. H. Layard found a crystal lens among the ruins of Nineveh. In one place it is recorded that the sun was “spotted” on the first day of the Chaldean year, from which we may infer the presence of an unusually large spot. What makes these notices the more interesting is that they are for the most part embodied in the work, consisting of seventy tablets (now in the British Museum), compiled for Sargon of Agane about 4000 years ago, and are therefore of astonishing antiquity. The catalogue of this work, however, in spite of its age, has a curiously modern direction to the student, who is told to write down and hand to the librarian the number attached to the book he wishes to consult. Such a touch of modernism almost convinces us that there is nothing new under the sun. One of these observations, an eclipse of the moon observed at Babylon in the year 721 B.C., while Hezekiah was reigning in Judah, has become famous in astronomy; for Laplace, calculating by modern tables the moment of this eclipse, found it two hours earlier by the ancient record than by his results it should have been. A few observations of the early centuries after Christ gave similarly conflicting testimony, the discrepancy varying always proportionally to the antiquity of the observation, from a few seconds in the more recent to the two hours above mentioned in the most ancient. The acceleration was found to be very regular at ten seconds a century; and in 1787 Laplace was able to show from mathematical considerations that the moon's speed in her orbit was increasing, and that the causes of this increase would produce exactly this acceleration of ten seconds a century, thus vindicating in a most astonishing way the accuracy of the Chaldean observation of twenty-five centuries before.

But along with a good deal of keen observation and just inference went much false theory and pseudo-science. Astrology and divination of all kinds flourished in Babylonia. Even the broomstick of the modern witch has its parallel in the “beam of wood” on which the Akkadian witch rode through the air. Space forbids us to deal with this curious subject.

Law, Commerce, and Agriculture.—With all their superstition, however, the Babylonians were a shrewd and practical people. Law and commerce flourished among

them, and an Akkadian code of laws, the oldest known code in the world, is remarkable for the mildness and justice of some of its regulations. Even the slave is protected against his master; and in one of our most recent laws at the present time we have but revived the ancient Akkadian clause, that “whatever a married woman incloses shall be her own.” Precedents seem to have been as much honoured as in our own law, and fine or imprisonment waited contempt of court. We learn from an old table of moral precepts addressed to kings, at a time when Sepharvaim, Nipur, and Babylon were under one government, that royal judges existed throughout the kingdom, and prisons were erected in all the towns. The merchants of Nineveh traded with eastern India on the one side (the way thither having been opened by the conquests of Tiglath-Pileser, who penetrated to the frontiers of the Punjab), and with the Greeks of the west on the other. Carchemish, once the capital of the Hittites, became a meeting-place for merchants of all nations, and the Aramaic dialect of northern Syria was made during the later times of the empire the common language of commerce and diplomacy.

Houses were leased and sold, lands mortgaged, and money lent at interest. A deed, translated by Dr. Oppert, and dated the 20th of July, B.C. 709, records the sale of three Israelites by a Phœnician, and another of the same period describes the sale of a girl by her father and brothers to an Egyptian lady who wanted a wife for her son. The girl was only valued at £2 8s., but, curiously enough, the fine for a breach of the contract was fixed as high as £90. Other tablets are private deeds of the family of the Beni Egibi, who seem to have been the Rothschilds of ancient Babylon. These accounts of taxes, deeds of mortgage, memorandums of loans, with the rates of interest, &c., prove the existence of commercial transactions of considerable complexity and of wide extent. So great was the wealth of the people that the city and province paid to Darius Hystaspes a yearly tribute of 1000 talents, or over £280,000 sterling.

The Assyrians had even a stronger instinct for trade than their neighbours the Babylonians, among whom the ancient Akkadian love of agriculture survived to the last. With its well-regulated system of irrigation, its numerous canals, and its carefully-tended fields, Babylonia must indeed have been the garden of the world. The ancient name of the Babylonian plain (*Gan-danu*) is manifestly *Gan-edén*, “the Garden of Eden;” and its sacred tree, guarded by a revolving sword, its dragon or serpent, the fiery weapon in the hand of the guardian angel, and the four rivers, Euphrates, Tigris, Surappi, and Ukni, are points of resemblance almost incontrovertible. Indeed the two first rivers are actually named in Genesis. The soil was so fertile that Pliny says, even in his time, after the decay of the ancient civilization, wheat was cut twice a year, yielding two and three hundredfold to the sower, and then gave good food for sheep; while wheat, barley, sesamum, palms, apples, grapes, &c., grew wild. The date-palm gave bread, honey, a sort of wine, vinegar, and materials for weaving, in itself. The utter contrast of the present state of the land is most remarkable.

Art.—Assyrian art, like Assyrian literature, was as exotic transplanted from the Babylonian south; but whereas the northern kingdom remained stationary in the latter branch of culture, in the former a considerable development took place, due in great measure to the difference of the nature of the soil. Assyria gave plenty of stone, whereas in Babylonia, though bricks were ready to hand in unlimited abundance, stone was a precious substance. Yet so slavish were the Assyrian imitators, that large quantities of brick were always used in their constructions. The Babylonians ornamented the rough brick cores of their walls with fine enameled bricks or tiles, rather gaudy in colour; the Assyrians used the sculptured stone slabs so familiar in our Museum, or where they used colour more

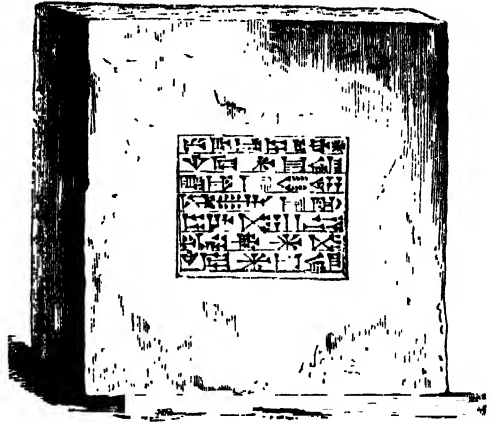
subdued tints were preferred. Both nations were fond of gilding. It would be proper to describe in a rough way the predominant art in Babylonia as painting and internal, in Assyria as sculpture and external. The figures in the bas-reliefs of Assyrian palaces were frequently slightly tinted, the hair, eyes, fringes of garments, &c., being touched with colour.

The palaces of Assyria are matched by the temples of Babylonia, the newer country giving up its sentiments of reverence to the service of the monarch, the older to that of the gods. These temples were also used as observatories, and were generally in many stories, as we know (from Herodotus) were also the houses in Babylon; whereas the palaces of the sister kingdom were often in one story, hardly ever in more than two. Vast groups of tombs are also peculiar to Babylonia, as in the mighty necropolis of Erech.

Stone being so valuable in Babylonia the work upon it was careful in proportion, and some fine monumental work still exists, especially one bas-relief in the British Museum, which shows in a most marked manner the Turanian features of the ancient Akkadian physiognomy, quite distinct from the Semitic or Jewish type of Assyria and later Babylonia.

The cutting and engraving of gems, as in the annexed illustration from a signet-cylinder, was also carried to great perfection by the Babylonians, and many beautiful specimens have been found of their work in this respect. Their woven fabrics, cloths, and carpets were in high renown throughout the East, being made of the finest cotton, of beautiful texture, and dyed with brilliant colours. According to Pliny, one of the dining-rooms in the palace

portant edifices were constructed, the latter being substituted when more finished and careful brickwork was required. The kiln-baked bricks are generally of a pale-red hue, and they bear an inscription in the cuneiform character. In the Assyrian bricks the inscriptions cover one of the sides, or they sometimes run along the edge; but the Babylonian brickmakers stamped their inscriptions with moulds that



covered only a comparatively small portion of the surface of each brick. The inscription upon the above specimen from Babylonia, now preserved in the collection of the Royal Society of Literature, is read by Sir H. Rawlinson as follows:—

(of) NEBUCHADNEZZAR,
the king of Babylon,
founder of Beth Digla, or Saggalu,
and of Beth Tzida,
SON of NAROPALASSAR (I am).



of Nero was hung with Babylonian tapestry which had cost a sum equal to about £32,000 of our money.

As the art of Babylonia and Assyria declined Greek art arose; the lions of Mycenæ, and especially the more ancient ones of Phrygia, are evidently descendants of the lions of Nineveh. The varieties of Greek columns, even to the Corinthian, are found in embryo in the bas-reliefs of Nimroud and Kouyunjik; and the Gothic device of resting a pillar on an animal's back (as in the famous pulpit at Pisa, &c.) was a favourite fancy with the Assyrians. But it is certainly very remarkable that the Greeks did not borrow the idea of the arch with the rest of the Babylonian architectural principles; for, contrary to the notion hitherto received, that the Romans were the first to discover the arch, many examples of it are found in the large drains and passages, and in the gateways and doorways of the vast palaces and temples of Assyria and Babylonia. Hitherto no large chamber-roof has been found preserved sufficiently to show its shape, so that the application of the arch to larger spaces is not yet proved.

Both the Assyrians and the Babylonians used sun-dried bricks, as well as those that were baked in the furnace. The former were chiefly employed in the construction of the massive and lofty mounds upon which the more im-

The rectangular bricks of Assyria vary in size from a square of 22 inches to one of 12 inches, many of the varieties being elongated rectangles; their thickness also varies from $4\frac{1}{2}$ to 3 inches. The Babylonian bricks are smaller, their maximum dimensions being a square of 14 inches by 4 inches in thickness. Certainly the building power of this wonderful people has never been equalled; the mound, 200 feet square and 100 feet high, on which the temple of the Sun-god at Warka was erected—to take an example at random—has been measured and found to contain 80,000,000 bricks; and this is but one structure of a multitude.

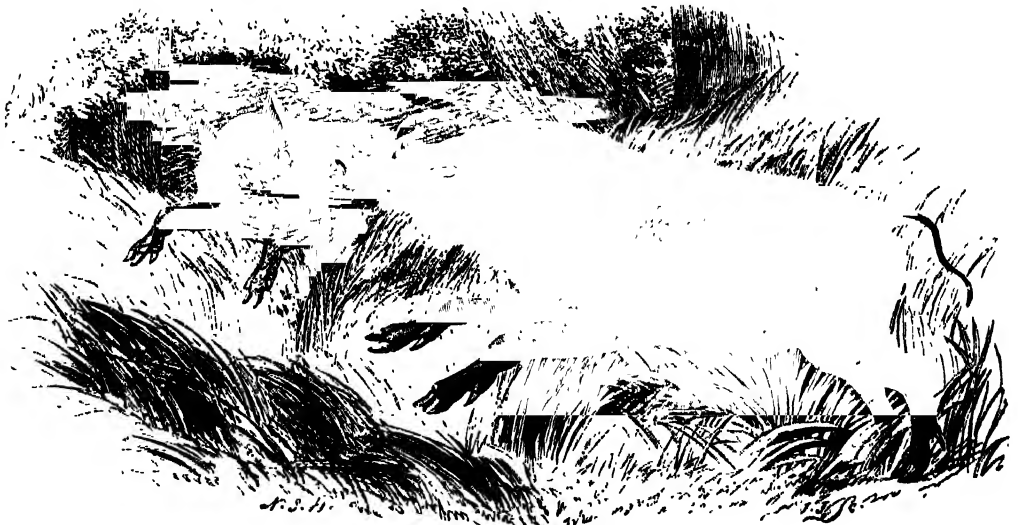
Researches are still being actively pursued, and every year adds to our knowledge of this highly-wrought civilization. The results obtained touch upon so many interests, and explain so many obscurities, in art, history, language, and religion, that new discoveries are always hailed with eagerness. The greater part of the buried treasures is as yet unexplored, and all writers on the subject anticipate further and possibly yet more extraordinary revelations when the necessary expenditure is provided, and explorers skilful and bold as those who have previously worked are induced to undertake fresh enterprises.

The standard works on the subject are Rich's "Babylon," Layard's "Nineveh and Babylon," Loftus' "Chaldea," Rawlinson's "Five Great Monarchies," Lenormant's "Premières Civilisations," George Smith's interesting personal records of "Assyrian Discoveries" and "The Chaldean Account of Genesis" (Lond. 1876), Professor A. H. Sayce's revised edition of the last-named (Lond. 1880), and his original "Babylonian Literature" (1879).

BABYLO'NIAN CAPTIVITY. This name is generally given to that deportation of the people of the kingdom of Judah which took place B.C. 588, during the reign of King Zedekiah. The people of the kingdom of Israel had been removed long before, B.C. 721, by the Assyrian monarch Sargon, son of Shalmaneser, who also brought strangers into the land of Samaria to take their place. At this period the kingdom of Babylon was engaged in a warfare with that of Egypt, and Zedekiah, the king of Judah, despite the warnings of the prophet Jeremiah, allied himself with the latter power. The Babylonians were victorious in the war, and Nebuchadnezzar repeatedly invaded Judea, and several deportations of the people took place. The first of these appears to have been during the reign of Jehoiakim, when Daniel and his companions were taken, and was possibly B.C. 606, a period when Nabopolassar was reigning over Babylon, his son Nebuchadnezzar being his viceroy. The second was in the seventh year of Jehoiakim, and the third took place B.C. 598, during the reign of Jehoiachin, who, with the nobles, soldiers, and artificers, was carried away to Babylon.

The fourth captivity was that referred to, B.C. 588, when Jerusalem was taken by Nebuchadnezzar, who plundered and burned the temple, and after causing the children of Zedekiah to be murdered in his presence, put out his eyes and brought him in chains to Babylon. It is this captivity that is commonly called the seventy years' captivity, being reckoned from the first raid under Nabopolassar; but the duration of the complete captivity was fifty-two years only. The Jews, though removed from their own land, appear to have been treated as colonists rather than slaves. They were unable to observe their national feasts, nor, the temple being destroyed, could they offer any sacrifices; but they had their priests with them, and they were permitted to worship the God of Israel, and to observe their laws relating to food, &c. They acquired land and

amassed wealth, and some of them attained to posts of considerable eminence, like Daniel and his friends, and Nehemiah. We have descriptions of their life while at Babylon in the Books of Jeremiah, Ezekiel, and Daniel, and also in the apocryphal Book of Tobit, while several of the Psalms were evidently written during the captivity and after the return. On the conquest of Babylon by Cyrus, B.C. 538, the Jews received permission to return, and a portion of them under Zerubbabel accepted the offer in B.C. 536. They seem to have been but a small portion of those who were settled in Babylon, the number being given by Ezra as 42,360, of whom 30,000 belonged to the tribes of Judah, Benjamin, and Levi. It has been supposed that the remainder were gathered from the representatives of the kingdom of Israel, the ten tribes that had been removed in 721 by the Assyrians, but the matter is not very clear. Another migration from Babylon took place, B.C. 458, under the command of Ezra, and a third thirteen years later, B.C. 445, under Nehemiah. The ten tribes appear never to have returned, and they most probably had become merged into the Assyrians, a kindred people with whom it was easy to assimilate. Various attempts have been made to discover what became of them, and they have been identified with the Kurds, Afghans, Nestorians, North American Indians, and still more wildly with the Angles who invaded Britain; but no real trace of any separate existence has yet been discovered. A portion we know were left in Samaria, and, mingling with the Assyrian strangers who were introduced, became the Samaritans. Others, who kept to the worship of Jehovah, probably identified themselves with their brethren from Judea, both in Babylonia and in the return, but the majority appear to have soon lost all distinctive nationality or religion. Of the kingdom of Judah a large number remained in Babylon, forming the Jews of the Dispersion, and from there they spread out and formed colonies in most of the great cities of the civilized world.



The Babyrusa (*Sus babyrusa*).

BABYRU'SA (*Sus babyrusa*) is a large hog inhabiting the Malayan Peninsula, Celebes, and Borneo. The name is of native derivation, meaning "hog-deer." The male has an extraordinary development of the canine teeth of the upper jaw. Piercing the snout they arch over the face, curving backwards in some cases so far that they become imbedded in the skull. As this must make them useless as offensive weapons, there has been much speculation as to the utility of this development. The old idea was that

they supported the head by suspension to a bough while the animal was sleeping. It has also been conjectured, and with more probability, that they are designed to protect the eyes from injury during the animal's progress through thick bushes. The tusks of the lower jaw are sharp and powerful, forming formidable weapons of attack. The babyrusa is almost devoid of hair, and has long and slender legs, which enable it to rival the deer in speed. See **SUMÆ**.

BAB'YSM, a new religion, founded in Persia, which

may possibly be destined to exercise a powerful antagonism to Mohammedanism. It originated in 1843 at Shiraz, with Mirza-Ali-Mohammed, a young man of nineteen years, who gave out that he was the genuine successor of Ali, the true prophet of Iran. He announced to his disciples that he was the Báb, that is to say, the gate, the mystic gate, by which alone one could enter into the true faith and acquire a knowledge of God, and from this name his followers have received the name of Bábys. Ali attacked the fundamental vices of Mohammedan society; he condemned polygamy and censured the veiling and seclusion of women; and by abolishing the laws which forbade the intercourse of true believers with unbelievers, he introduced a new element of progress into Persian society. Had the new prophet been satisfied with the part of a reformer only, he would have been safe in the strength of his popularity; but he chose to found a new religion on the ruins of the one he condemned, and thus eventually led his followers into a fatal struggle with the government.

The spiritual conquest of Persia was resolved upon, and for purely defensive purposes an armed force was raised. In their first encounters with the royal troops the followers of Mohammed Ali overcame forces twice as large as their own. It seemed as if the Bábys would have succeeded in establishing their republic; but they were overwhelmed by superior numbers, and hopelessly defeated after a most gallant and protracted resistance. A general proscription was decreed against the Bábys; to be a follower of the Báb was to be declared guilty of high treason, and thousands of innocent persons were tortured and put to death. Mirza Ali himself and his principal apostles were barbarously executed. The shah forgot that "the blood of the martyrs is the seed of the church." A youth sixteen years old, named Mirza Yahya, was chosen as successor to the Báb, and took up his residence at Bagdad. Here, sheltered from persecution, on the frontier of two Mohammedan empires, and in the midst of a great concourse of travellers and pilgrims, the new religion has planted its standard, and continues its mission, which seems far from being as yet completed.

The religion of the Báb addresses itself to the mind rather than to the body; thus it prefers meditation to prayer, and solitary prayer, as being most akin to meditation, to prayer in public. The functions of its ministers are limited to the duties of praying and teaching.

The religion of the Báb does not desire any painful sacrifices from mankind. "All that is demanded of you by the Most High is love and contentment," says the Báb. The general character of its morality is summed up in two obligations: "Charity towards others, and circumspection as regards oneself." The first form of charity is doing good to the poor and the wretched. Hospitality is just as much an obligation as almsgiving; it must be practised at least once a year towards a poor man or a stranger, even if one have nothing more to offer than a cup of cold water; and rich men are to invite to their table a number of poor guests proportionate to their wealth. In the Book of Precepts it is written, "O ye rich, enrich the poor on the part of your Lord;" but on the other hand, it is forbidden to give to beggars, for to beg is sinful.

The true believer is to be charitable and indulgent to others, and not to be too severe with himself; fasting and other trials of endurance are forbidden him after the age of forty-two, and long and distant journeys are to be avoided. His virtues are to be, so to say, every-day virtues—not heroic virtues, which require to be brought forth by extraordinary circumstances. All that can render life agreeable and increase his gratitude to his Creator, is allowed to the true believer, so long as he does nothing which can injure him; but opium and fermented liquors are forbidden. The Báb and his colleagues hold almost all the property of the society, and have the right to levy

very heavy taxes. With the money thus collected they are able to maintain the priests, keep up the religious buildings, assist the poor, alleviate distress, and educate the faithful. There is not much originality in this system, and its dogmas are chiefly borrowed from ancient systems. Its most original feature is the principle of the permanent incarnation of the Deity in a body of nineteen persons. It is, however, so much more imaginative, more liberal, and more enlightened than Islamism, and it has done so much good by abolishing polygamy and raising the status of women, that it possesses advantages over it which make it a formidable rival, destined, perhaps, some day to displace the official religion, and to form the connecting link of transition between Europe and Asia.

BACCA, or Berry, is a term used in botany for a fruit which is pulpy, many-seeded, thin-skinned, with the calyx teeth remaining at the top (inferior). It is produced by one flower, and has originally many cells; the seeds become freed from their attachment as the ovary ripens, and become scattered in the pulp. The term is thus properly applied to the gooseberry and currant, but not to the grape, in which the calyx does not crown the fruit (superior); but the adjective *baccate* is often applied to all succulent fruits, whether superior or inferior, so long as there is no hard stone. *Baccate* is also applied to parts of flowers whose texture is juicy and succulent, as in the calyx of Blitum.

BACCHANALIA, feasts or festive rites in honour of Bacchus, at which a mixed crowd of men and women, intoxicated with wine, clothed in deer-skins and Asiatic robes, and carrying thyrsi in their hands, ran up and down the country shouting, beating drums and cymbals, and crying, "Evoe! Io Bacche!" &c. They were introduced at Rome B.C. 187 (Livy, xxxix. 8). These rites were celebrated every third year, and were hence called *Trieterica*. They must be distinguished from the vintage festivals, on which see the article *BACCHUS*.

BACCHANTES, *Bacche*, *Menads*, or *Thyiads*, originally the female companions of Bacchus in his Eastern wanderings—half-nude and half-mad creatures, their garment a rough skin, their ornament or trophy a *thyrsus*, a rod terminated by a fir-cone (turpentine being used in making wine) and wreathed with ivy or vine leaves. Later the term was extended to include the raving women with tossing heads and dishevelled hair who joined in the tipsy riots of the *BACCHANALIA*, and whose excesses are the theme of many ancient stories. Carrying torches or thyrsi, they repaired to the woods near the towns by night, and made the dark hideous with drums, cymbals, discordant songs, and shouts. An ox was sacrificed, and the custom was for the frenzied women to tear the flesh with their hands.

BACCHIGLIONE, a river of Venetia, North Italy, which has its source in the Alps. It passes the cities of Vicenza and Padua, and about 30 miles below the latter enters the Adriatic at Brondolo, opposite to the island and town of Chioggia. The Bacchiglione is navigable for large boats from Vicenza to the sea. Its whole course is about 90 miles.

BACCHUS or **DIONYSUS** (Lat.), the god of wine, called also by the Greeks Dionysos, Bromios, Lyaios, Dithyrambos, Bakhos, and, with good cause, "the God of the Many Names," was the son of Zeus by Semele, daughter of Cadmus, the founder of Thebes. Hera, consort of Zeus, enraged at his amour with Semele, came to her in disguise and deceitfully persuaded her to ask Zeus to appear to her in all his majesty. Zeus having rashly sworn by the Styx (an irrevocable oath) to grant whatever petition she should ask, was compelled to accede, and Semele was consumed by the lightnings of the god. Bacchus, born out of time in Semele's death-agony, was saved by Zeus, who sewed him up in his thigh until the due period for his birth. To

save the child from the persecution of Hera, Zeus intrusted him to the nymphs of Mount Nysa, in Thrace, who reared him, and were rewarded by being set in the sky as the constellation Hyades. Hence the older name of the god, for according to Greek etymology *Dio-Nysos* (Dios being the genitive of Zeus) meant Zeus of Nysos. Professor Max Müller prefers a Sanskrit etymology in his *Ilibert Lectures* (London, 1878, page 278, note). He would read *Dyu-nis-ya*, the child of *Dyu-Nis*, that is, of day and night, or of heaven and earth; and this agrees with the strongly supported theory of his original solar signification stated below. Bacchus, which means literally "the noisy," was an epithet even later than the time of Herodotus, though almost exclusively used as the name of the god by the Romans.

On attaining the years of manhood Bacchus was driven mad by the revengeful Hera, and set out on a journey through all known countries, attended by BACCHANTES and bearing the thyrsus, a pole entwined with ivy or vine leaves and surmounted with a fir-cone, in his hand. Wherever he went he instructed men in the cultivation of the vine, in addition to many other of the peaceful arts, being generally received as a benefactor of mankind. Those who opposed him and denied his divinity were punished with severity. Thus Pentheus, king of Thebes, who endeavoured to check the excesses of the Bacchanalia, was torn to pieces by his own mother and sisters in a Bacchic frenzy, and Lyncurgus, king of Thrace, who seized and detained the riotous crew surrounding the god, was punished by an attack of madness, in which he slew his own son, and afterwards in despair killed himself. One of the most famous myths of Dionysus has been related in the article *AKIANE*.

The worship of Dionysus and the attributes claimed for him exhibit remarkable diversity; and it is now generally admitted that they are compounded from quite separate traditions, possibly from distinct countries. In Homer, Dionysus is simply the wine-god; but the original oriental signification is rather that of a god of sunbeams in their character of ripeners of fruit, and hence especially of the joyous vine. Faces or heads of Bacchus, termed *oxilla*, were suspended from trees in the vineyards of Italy to be turned and twisted by the wind, since the superstition was rife that whichever way they looked the vines in that direction were sure to be fruitful. Such an *oxillum* (or "little face") in marble is in the British Museum, still bearing the ring by which it hung. In winter, the season sacred to Bacchus, the Dionysia or BACCHANALIA commemorated his madness and his wanderings, as well as the wild joy produced by indulgence in wine. These festivals gradually became accompanied by dithyrambic hymns (one of the god's names being Dithyrambos, "twice born"), in which passages in his career were recited by the singers, and as the character of these hymns developed, during early times, passages in the career of other gods and heroes came also to be included in their scope. Little by little the form of the dithyramb altered, until we find a reciter or chief actor leading a responsive chorus; and from this germ of dialogue and chorus sprang the GREEK DRAMA, of which Bacchus was always held the god and patron. The chief festivals of the god were—(1) the Lesser Attic Dionysia, held at the time of the grape harvest, and celebrated with rustic sports, dramatic entertainments, and a public banquet. One of the amusements at this festival consisted in the leaping of the young men with one foot on full wine skins smeared with oil, the sport being termed the *askolia*. It was followed (2) by a festival called the Lenææ, which was peculiar to Athens. This was celebrated also by dramatic entertainments and banqueting, but it had a special feature—viz. a procession of women at night attended with wild excitement. After the Lenææ followed the (3) Anthesteria, in March, when the new wine was first drunk, and at which a public banquet

was held, where the guests challenged each other to drinking bouts in honour of the god of wine. Lastly came the principal annual festival of the (4) Great Dionysia, which was held in Athens in the month of April. At this festival there were representations of the new tragedies and comedies, and a procession was made from one temple to another, the wooden image of the god being carried in triumph attended with music and song. The worship of Bacchus was introduced from Greece into Rome B.C. 496, and it degenerated there into the wildest and most savage excesses. Men and women joined in the celebrations, and the licentiousness permitted at last reached such a degree that the Senate instituted a stringent inquiry, and in 186 B.C. prohibited the celebration of the Bacchanalia under very heavy penalties.

In works of art Bacchus was variously represented. The most common form was that of a young man of an almost feminine type of beauty, beardless, and with long hair falling about his shoulders or bound up in a knot behind, and adorned with a wreath of ivy or vine leaves. Sometimes he was represented nude, and at other times partly draped in a loose robe, or with a deer-skin over his shoulders, and riding on a panther or lion. Another form, called the Indian Bacchus, represented him in a far more dignified manner as a man of mature years, having a long beard, wearing a crown, and draped in a tunic reaching to the feet, over which was a splendid mantle. A favourite subject with ancient sculptors is the infant Bacchus in the care of the grotesque SILENUS.

BACCIO DELLA PORTA, better known as *Fra Bartolommeo di San Marco*, one of the greatest painters of the Cinquecento in Italy, was born at Savignano, near Prato, in Tuscany, in 1469. He studied first under Cosimo Roselli, in whose studio he met Mariotto Albertinelli, who was throughout his life his faithful friend and companion. He afterwards gave himself up to the study of the works of Leonardo da Vinci, towards whose style he always felt a decided inclination. His talents were recognized by the Dominican monks of San Marco, the convent once the home of Fra Angelico, and he produced for them a number of paintings of religious subjects, of which the best known is the large fresco in the great refectory representing a miraculous relief of the brethren from impending starvation by the mercy of two ministering angels. He afterwards came under the influence of Savonarola, prior of San Marco, and became his devoted follower. On the martyrdom of this brave reformer, Baccio sought retirement in the convent of the Dominicans at Prato, and for four years he gave up painting altogether, but was induced at the end of that period to resume it by the command of his superior. A stranger who called one day at the cloister inquiring for the Frate, proved to be the immortal Raphael, then only twenty-four years old, and the two painters became most intimate friends. To Raphael the Frate revealed all the mysteries of his incomparable colouring, and his method of the treatment of drapery, while Raphael in his turn initiated his friend into the newer styles of perspective. In 1518 Bartolommeo visited Rome, and there, in the presence of the sublime works on which Michael Angelo and Raphael were engaged, was struck with admiration and surprise, accompanied by a painful feeling of the inferiority of his own productions. In him there was no ignoble feeling of jealousy. While at Rome he was a frequent visitor at the studio of Raphael, to whom he intrusted on his departure for Florence two of his pictures, which Raphael finished with as much care as if they had been his own. On his return to the cloister Fra Bartolommeo resumed his work with renewed fervour, and produced the masterpieces of his life, amongst which may be mentioned the St. Mark (now in the gallery of Florence), the St. Sebastian, and the Madonna della Misericordia. He died in 1517 at the age of forty-eight.

Most of his compositions were altar pieces, and very few are to be seen out of Italy. The finest collection of the master is in the Pitti Palace at Florence. Amongst the examples at his old convent the most touching is a portrait, finished with the most intense earnestness, of his friend and superior, the martyr Savonarola.

BACH, the family of musicians remarkable above all others for the number and ability of its members, who for two centuries successively distinguished themselves throughout Lutheran Germany. Their origin is traced to Veit Bach, a miller and baker of Presburg, who left his adopted country in consequence of the religious troubles that prevailed there in the latter part of the sixteenth century, and returned to his native Wechmar, a village of Saxe-Gotha, where he pursued his calling, and became noted for singing to his accompaniment on the guitar. The father of Veit had been a musician, and Veit's two sons were both reputed for their musical talent. The elder, Hans, a carpet weaver, died in 1625, leaving three sons, who were all sent by the Count of Schwarzburg-Arnstadt to Italy, to develop the great disposition for music which they evinced. In the next generation Johann Christoph and Johann Christian, at Eisenach, and Johann Ägidius and Johann Michael, at Erfurt, were distinguished organists and composers. Johann Ernst, the grandson of Ägidius, born at Eisenach in 1722, at which place he was afterwards kapellmeister, took a prominent rank beside his cousins, the distinguished sons of the colossal Johann Sebastian. His music has great merit. The descendants of the earlier branches of the family, who followed music as a profession with less consideration, were so numerous that towards the end of the seventeenth century there was scarcely a town in Thuringia, Saxony, or Franconia, that had not one of the Bachs as organist, or cantor, or official head of all musical arrangements. The Bachs were as much united by brotherly as by artistic feeling, and they held an annual meeting at Eisenach, Erfurt, or Arnstadt, for interchange of greetings and comparison of progress. As many as 150 of these relatives have assembled on such occasions, when their chief amusement always consisted of mutual musical performances. The compositions of all of them were kept together in a constantly-growing collection, that was called the Archives of the Bachs; which valuable and interesting family memorial was in the possession of C. P. Emmanuel Bach at Hamburg, when he died in 1788, and then passed into the hands of M. Pöschel, a famous collector of music at Berlin. The sons of Emmanuel were the first of the Bachs that deserted the pursuit of their ancestors.

BACH, JOHANN SEBASTIAN, the great musician, not only the most distinguished of his remarkable family, but one of the most illustrious men in the history of the art, was born at Eisenach on the 21st of March, 1685, and died at Leipzig on the 30th of July, 1750. Bach has been called the "German Handel" (Handel being fairly claimed as English by adoption); but this is quite incorrect. Handel was and still is the favourite of England from king to peasant, Bach was as strange to Germany as to England; and the appreciation of his surpassing genius has grown up as slowly and as surely in the one country as in the other. His music is more played and sung now than ever before; and it is not too much to hope that when he shall have been dead two centuries the general musical public will be able to rise to the level of appreciating those profound masterpieces of thought in music which have hitherto formed the exclusive delight of trained musicians. The works of Bach are still, as it were, a musical shibboleth. The very love of them is of itself a proof of the highest musical culture.

Since so many of the Bach family were distinguished musicians, and especially since so many were named Johann, it will be better to give a selection from that curious genealogy, comprising no less than twenty-four musicians out of fifty-three males, and running over eight generations,

which the illustrious subject of this article himself drew up, assisted by his son, C. P. Emmanuel Bach.

Hans Bach of Wechmar (1561).

Veit Bach, the miller of Presburg (d. 1619).

Hans Bach, "the musician" (d. 1619).

Johann Christoph Bach (1613-1661) and others.

Johann Chr. and Johann Ambrosius Bach (1645-1695) and others.

JOHANN SEBASTIAN BACH (1685-1750) and others.

W. FRIEDEMANN BACH (1710-1784).	C. P. EMMANUEL BACH (1711-1788).
J. CHRISTOPH F. BACH (1732-1795).	J. CHRISTIAN BACH (1735-1782) and 16 other children.

Wilhelm F. Ernst Bach, Berlin (1756-1846).

Aug. Wilhelm Bach, Berlin (1786-1830).

Johann Ambrosius, father of the subject of this article, was one of twin brothers, who were so much alike in person and voice that their wives could only know one from the other by their dress; their temper, their constitution, their talent, and their music were alike; when one was sick the other was ill, and their death took place very nearly at the same time. This occurred when J. Sebastian was but ten years old. His elder brother, Johann Christoph, taught him the principles of the art for which his family was famous. It is not to be supposed, however, that in the household of his father, a musician, he had not made the early familiarity with music, without which even his marvellous organization could not have been developed. His own ardent love of his pursuit, and his brother's want of sympathy with this, are equally proved by an anecdote recording the little lad's desire to study some of the compositions of the most profound writers of the day, and his being forbidden the use of a volume which contained them. He procured the book, however, by stealth, and copied the valued pieces, which, as he was obliged to do it in secret, he could only write on moonlight nights, and thus spent six months upon the task. He had scarcely finished his labour when his brother discovered the transcript and took it from him, and he did not regain it until the death of Christoph. He was now but fifteen, and yet thrown entirely on his own resources. He went with a schoolfellow to Lüneburg, and obtained there an engagement as treble singer in the choir of St. Michael's School, which he kept till his voice broke. With enthusiasm that no difficulties could check, he walked several times to Hamburg to hear the performances of Reinken, the famous organist. When he was eighteen he was engaged to play the violin in the band of the Duke of Weimar, and it was probably then that he became acquainted with the concertos of Vivaldi. To these he always attributed his first grasp of those principles of musical construction that he subsequently developed, and carried to such completeness as to make his works a model of "form" for all time. Especially devoted to the organ as an instrument, and anxious for a field in which to exercise his wonderful powers of invention, he gladly quitted the duke's service in the following year to accept the office of organist at Arnstadt, in which, for the first time, he had an opportunity to prove his remarkable ability. While in this situation he made several art-pilgrimages for the sake of hearing any player from whose experiences he might derive improvement. In particular, he once walked to Lubeck, where the organist of St. Mary's Church was the celebrated Buxtehude, with whose

playing and composition he was so delighted that he prolonged his stay for three months, drawing on his head the censure of the church officials. In 1707 he was appointed organist of the Church of St. Blasius at Mühlhausen, in which place we may suppose he married his relative, the daughter of Johann Michael Bach of Gehren, by whom he had seven children. The year following he returned to Weimar, no more in the subordinate capacity of an orchestra player, but in the important character of organist. His reputation as an executant, as a composer, and as an extemporist, began now to spread itself all over Germany, and his unremitting study gave even further justification to the high esteem in which he was held. In 1717 Prince Leopold of Anhalt-Köthen, a great lover of music, observing and appreciating the rare talent of Bach, offered him the office of master of his chapel and director of his concerts, which, as giving him still greater opportunity for study and composition than he had yet enjoyed, he gladly accepted. On the death of Zuckmayer, the master of Handel, Bach was invited to succeed him as organist at Halle, and went there to prove his fitness for the appointment; but for some unknown reason the post was given to Kirchhoff, a pupil of the former organist. About this time Marchand, a French player, was exciting great admiration at the court of Dresden; and it was proposed that Bach should make a trial of skill with him, to prove the superiority of French or German art. Accordingly Bach went to Dresden, and having heard his rival, and so satisfied himself that he was worthy to compete with him, sent him a most courteous challenge, which Marchand accepted. On the appointed day Bach appeared before the elector and his retinue, but Marchand, after he had been long waited for, was ascertained to have suddenly quitted the city; he thus left the field to his opponent, who made such a performance as satisfied all present of his incomparable ability. In 1722 he revisited Hamburg for the purpose of again hearing the veteran Reinken, then nearly a hundred years old. It was not as a mere listener that he now met the master; he was on this occasion to prove himself a noble successor to the old man's reputation, which he did by extemporizing at great length, and with such effect as only his wonderful genius could produce, on one of the Lutheran chorales or hymn tunes, when Reinken exclaimed, "I thought this art would die with me; but here I find it has a more able representative." In this year Bach's first publication appeared; for although from a very early period he had with ceaseless assiduity studied and practised composition, and thus developed the style entirely his own, it was not until his thirty-eighth year that one of his works was printed. This publication, the first part of "Das Wohltemperirte Clavier," famous in England as the "Forty-eight Preludes and Fugues" (the latter half of which was written some years later), was reprinted three times during his life, and according to Bach's usual habit, underwent very important modifications in each successive edition. With reference to this work it is appropriate to state that Bach liked especially to play upon the clavichord, a portable keyed instrument of small power, which, unlike the harpsichord, yielded more or less tone according to the force used by the player; and that, disregarding the custom which had prevailed until his day, of writing in a few keys only, and tuning keyed instruments so as to render these keys nearly perfect at the expense of the rest, he used to tune in equal temperament. Tuning was a task he never would trust to another, and which he accomplished with singular rapidity. It is also to be remarked that he was the first who used the thumb and the fourth finger in fingering on the pianoforte key-board; and his preludes and fugues in each of the twelve major and twelve minor keys exemplify as well his method of tuning as his system of fingering. In 1723 the most important event in his career, his appointment as cantor of St. Thomas' School in Leipzig, obliged

him to resign his engagement with Prince Leopold, who, however, remained his warm friend till he died. Bach wrote a funeral cantata for his obsequies. In his new situation the master, now generally acknowledged as such, and a larger field of action than he had yet enjoyed. His playing became more and more famous, and he had constant opportunity for the production of important works.

His income was soon increased by his additional appointment as composer to the Duke of Weissenfels; he had many pupils for composition and for playing; he was frequently engaged to judge new organs and to select organists, and he now published numerous works. Many as were these sources of income, the expenses of his numerous family, and his hospitality to the artists from all countries who visited him, necessitated frugality in his household; but though he might, had he travelled as a player, have gained riches and honours wherever he went, since there was no one who could equal him as an executant, he preferred the simple life with its simple means, which enabled him to labour uninterruptedly in his art, and to win the personal regard of all who had occasion to meet him. He now wrote the greater part of his enormous number of church compositions, including most of his motets and church cantatas, and his services for every Sunday and festival day for five years, for the use of his choir. Though he never wrote light music, he was not without relish for the compositions of others of a less severe character than his own; and accordingly used to make frequent pleasure-trips to Dresden with his eldest son, for the sake of hearing the operas of Hesse, then constantly given there. He had lost his first wife and now married a second, by whom he had thirteen children. This made a family of twenty in all, eleven sons and nine daughters. In 1736 he received the further appointment of kapell-meister to the court of Dresden, under Augustus III., an office which gave Bach occasion to write his masses and other pieces for the Roman service. He was unaffectedly pious; but without any of the polemical scruples that induced his ancestor to leave Hungary, since he wrote indifferently for the Lutheran Church and for that of Rome, although a zealous member of the former. He never sought popular applause; and approbation of his own severe taste being the goal of his endeavour, he disregarded the honour that everywhere awaited him; and thus he lived, composing and playing and teaching, advancing his art in all. He always had a great wish to know Handel, the only one of his contemporaries whom posterity ranks with him; and in 1719, while residing at Köthen, on hearing that the famous Saxon was visiting his native town of Halle, he went there in hopes to meet him, but found that he had departed on that very day. While Bach was at Leipzig Handel again visited Halle, when Bach, being prevented by illness from leaving home, sent his eldest son to invite him to come there, but equally in vain. Frederick the Great, a great lover of music, often inquired of Bach's second son, C. P. Emmanuel (who had an engagement at his court), after his father, in consequence of which Bach was persuaded in 1747 to visit Potsdam. The king was surrounded by his musicians, the usual evening concert was about to commence, and Frederick, with his flute in his hand, was ready to play the solo which was to be the first piece, when, according to custom, an officer presented to him a list of the arrivals in the town, on which he saw the name of the master. "Gentlemen," cried the king, "old Bach is come," and so broke up the meeting—the presence of the great musician engrossing all his attention. A messenger summoned Bach to the palace, without allowing him time to change his travelling dress, and the king received him with the most eager welcome. In the palace were several pianofortes, then newly-invented, made by Silbermann, and Bach must play upon them all. The king was delighted with his guest, and gave him a subject for a fugue, on which the master extemporized to the amaze-

ment of the many musicians and courtiers who gathered to hear him. Bach afterwards wrote a very elaborate work upon this theme, which he dedicated to his royal admirer. His sight had been injured at a very early age, probably by the moonlight transcription of his brother's forbidden volume; and it now failed him so greatly that he was persuaded to let an English oculist operate upon him. The experiment was unsuccessful, and a second attempt reduced the sufferer to total blindness. It is supposed that this course of treatment, and the violent medicines that accompanied it, induced the illness which prostrated him for six months and ended in death. Ten days before death his sight suddenly returned, but after a few hours he became delirious; then he had an apoplectic fit; and then he breathed his last, 28th July, 1750.

Bach was a most diligent composer. The quantity of his works is prodigious. He was, perhaps, the most severely conscientious artist that ever devoted himself to music; he deemed that to compromise his art would be to compromise himself, and that to lend himself to anything which did not, to the utmost of his power, tend to exalt it, was in the last degree unworthy of him and of music. He was the greatest contrapuntist that has been, and is especially remarkable for the strict integrity of his part-writing, the complexity of which, it must be owned, often prevents the broad and massive effect that greatly distinguishes the music of Handel from his; his very extensive employment of passing notes induces many harshnesses which will not bear analysis; and his principle of making each part in his score an independent melody is often carried out at the cost of the euphony and the clearness of the whole. These peculiarities were the result of his never-ending study; his wonderful power of expression evinced in his free movements, in his great choral works, particularly in his famous "Passions-Musik," is the manifestation of his transcendent genius. As he despised popular applause, his music is little open to popular appreciation; and it is, and always will be, much more interesting and much more satisfactory to those who participate in its performance than to any passive listener; his music is, beyond that of any other composer, difficult of comprehension, but its measureless beauties will ever repay the pains of the student who unravels them. Mendelssohn, we are assured, always kept some work of Bach's open on his pianoforte, and never passed a day without playing something of his. His principles of playing are detailed in his son C. P. Emmanuel's "*Versuch über die wahre Art das Clavier zu spielen*" ("Essay on the true Style of Pianoforte Playing"), and his system of composition in his pupil Kirnberger's "*Kunst des reinen Satzes*" ("Composition in the strict Style"). A list of all his known works is given in Dr. Forkel's *Life* and in M. Fétis' *Biography*. A monument to Bach was erected at Leipzig in 1843, at the instigation of Mendelssohn, who contributed largely towards its expenses, and gave some public performances of the master's music to further the fund. Wilhelm F. E. Bach (the music teacher of Frederick William III.), the last surviving descendant of Johann Sebastian, was present on this occasion. The Bach Society in London was founded in 1849 by Dr. W. Storndale Bennett, for the study of the master's works. A complete edition of his instrumental compositions has been published by Peters of Leipzig; thirteen volumes are pianoforte works, thirteen for pianoforte and other instruments, eighteen instrumental, and nine volumes for the organ. A complete collection of his still more numerous vocal works has been issued by the Bach Gesellschaft, which was instituted at the centenary of his death, to produce this publication by annual subscription. Both of these series contain works that have never before been printed. (See "*Life of Bach*" by Spitta, London, 1880. A good sketch of Bach's life and work was also published by Mr. Lane Poole in 1882.)

BACH, WILHELM FRIEDEMANN ("the Halle Bach"), a musician, the eldest son of the great J. Sebastian, was born at Weimar in 1710, and died at Berlin in 1784. His father taught him the organ and the clavicord and the principles of composition, and thought very highly of his ability; he learned the violin of the elder Graun. In 1747 he was engaged as organist at St. Mary's Church in Halle, and held the post for twenty years. His brother, C. P. Emmanuel, used to speak of him as the only artist worthy to succeed their illustrious father; and other contemporaries describe him as the greatest player, the greatest master of fugue, and the greatest extemporist of his day. His strangely uncouth temper, however, his moroseness, his constant fits of abstraction, and his addiction to drinking, rendered him a disagreeable acquaintance and incapacitated him for his duties; thus he had no friends, and even his talent failed to render him popular. He finally settled at Berlin, where he died in extreme poverty. He was too idle to write, and therefore he has left but few proofs of his power.

BACH, CARL PHILIP EMMANUEL ("Bach of Berlin"), a musician, the second son of the immortal J. Sebastian, was born at Weimar on the 14th of March, 1714; died at Hamburg on the 14th September, 1788. He learned music from his father, and attained such eminence as a player that Clementi professed to have derived from him that beautiful manner of singing upon the pianoforte for which he himself was especially famous (and which may be regarded as the distinguishing merit of all the disciples of his style), and such distinction as a composer that Haydn ascribed to him the principles of construction upon which he based his own greatness, and that Mozart used to speak of his productions as the standard at which he aimed in his own. This high esteem in which he was held, however, is mainly to be attributed to the little knowledge that then existed of his father's playing and compositions; and the illustrious authorities quoted above extolled in his reflection what they knew not in the great original. The qualities most valuable to the art, which the habitual privacy of the father's life concealed from the world, the son, whose courtly manners, personal amiability, and general intelligence rendered the universal favourite of society, made public, and thus the art and the world have the advantage of them. At Frankfort he established an academy of music, for which he wrote many compositions. He left this town in 1738 to settle in Berlin, where two years later he was appointed chamber musician to Frederick the Great—his duty being to accompany the king's flute performances upon the pianoforte. From his long residence in the Prussian capital he is often called Bach of Berlin, as from his subsequent settlement for twenty-one years at Hamburg, whither he went in 1757, he is also sometimes called Bach of Hamburg. He was the conservator of the famous Archives of the Bachs, which passed at his death into the hands of M. Pöschau of Berlin. His two sons—one an advocate and the other a painter, who died at Rome—were the first members of the Bach family that were not musicians. Besides several important vocal compositions, he wrote very extensively for his instrument. 210 solo pieces for the pianoforte are only a part of his works. His "*Essay on the true Style of Pianoforte Playing*" was a most important production, and laid the foundation of that branch of the art. The latest edition is by Schelling (1857).

BACH, JOHANN CHRISTOPH FRIEDRICH ("Bach of Bückeberg"), a musician, the ninth son of the famous J. Sebastian; born at Leipzig in 1732; died at Bückeberg in 1795. He studied jurisprudence in the university of his native city, being designed for the profession of an advocate; but his talent for music, which could not but be developed in his father's household, soon became conspicuous, and the Count of Schaumburg, appreciating this and entertaining a strong personal regard for him, engaged him as

his kapell-meister, and he lived at Bückeburg in fulfilment of the office. He never quitted Bückeburg save for a few months, when he visited his brother Christian in London. His numerous compositions are remarkable rather for their purity than vigour. His son Wilhelm F. Ernst, born at Bückeburg in 1756, and his grandson August Wilhelm (son of the last named), born at Berlin in 1786, were both reputed composers of instrumental music.

BACH, JOHANN CHRISTIAN ("The English Bach"), a musician, the eleventh and youngest son of the pre-eminent J. Sebastian, was born at Leipzig in 1735, and died at London in January, 1782. As his father died when he was but fifteen years old, he had less of the incalculable advantage of his instruction than either of his brothers. He completed his musical studies under his distinguished brother, C. P. Emanuel, whose position at the court of Berlin enabled him to give the young orphan not only a home, but an introduction to the best society. Christian's talent soon attracted attention, his excellent harpsichord playing was admired, and his compositions were successful. When he was nineteen he went to Milan, and was appointed organist of the Duomo. Here he wrote several operas, in which the severe school of his education gave way to the lighter Neapolitan style, and he won general favour. In 1762 Signora Matei, directress of the Italian opera in London, engaged him to come to England, and save for an occasional trip he never quitted this country. The clarinet was employed by J. C. Bach in his operas for the first time in England. Bach at once became a general favourite. He was engaged by Queen Charlotte as chamber musician, organist, and composer. He wrote constantly for the opera; he gave concerts in conjunction with Abel, the player on the viol da gamba; and he produced countless instrumental works, all of which were easy to play and extremely popular. His brother C. P. Emanuel often reproved him, by letter, as a renegade from the classical style of his father; but he used to reply—"Emanuel lives to compose, but I compose to live." It was his love of pleasure and his gaiety of character that induced the prevalent lightness of his music, rather than his want of ability to write in a more earnest style, as is proved by some motets he wrote for Germany, some masses for Rome and Naples, and even some pieces he wrote for the English Church, all of which severe critics warmly praise. He died at a much earlier age than his brothers, probably from over-indulgence, leaving debts to the amount of £1000, a brilliant popularity which did not long survive him, and a widow, who received from the queen £50 to carry her to her native country, and a pension of £80 a year as a tribute to his memory. Lovers of Mozart will always think kindly of "English Bach" for the generous reception he gave the lad when he came to London as a "musical prodigy."

BACHELOR, an unmarried man. The legislation of the Romans placed unmarried persons (*cœlibes*) under certain disabilities, the chief of which were contained in the *Lex Julia et Papia Poppæa* (A.D. 9). One object of the law was to encourage marriage. An unmarried person (*cœlebs*), who was in other respects qualified to take a legacy, was incapacitated by this law, unless he or she married within one hundred days (Ulpian, "Frag." xvii. 1). The law was the same if the whole property (*hereditas*) was left to a *cœlebs* (Gaius, ii. 111, 144, 286). It was always a part of the Roman policy to encourage the growth of families. A constitution of Constantine ("Cod." viii. tit. 58) relieved both unmarried men and women from the penalties imposed on *cœlibes* and *orbi*, and placed them on the same footing as married persons. This change was made to favour the Christians, many of whom abstained from marriage from religious motives.

In 1695 an Act was passed (6 & 7 Will. III. c. 6), entitled "An Act for granting to his Majesty certain rates and duties upon marriages, births, and burials, and upon

bachelors and widowers, for the term of five years, for carrying on the war against France with vigour." Bachelors above the age of twenty-five, and widows without children, paid 1s. yearly, and further according to their rank. Thus, for a bachelor duke the tax was £12, and other ranks in proportion. An esquire was charged 35s. a year, and a person of the rank of gentleman 5s. Persons possessed of real estate of £50 a year, or personal property of £500 value, paid 5s. A supplementary Act was passed two or three years afterwards (9 Will. III. c. 32), to prevent frauds in the collection of the taxes imposed by the former Act, but the tax was allowed to expire in 1706. In 1785, when Mr. Pitt proposed a tax on female servants, he exempted persons who kept only one servant, and who had two children. To make up for the deficiency he proposed that the tax on servants should be higher for bachelors than for others, and he stated that the idea of this tax was borrowed from Mr. Fox. This differential rate, though reduced in amount in 1838, was continued until recently; the number of servants charged at the higher rate being about 12,000 per annum, or rather more than one-tenth of the whole number charged. The law was that the tax on male servants as to bachelors was £1 in addition to the tax imposed on others. When the income tax was imposed by Mr. Pitt, in 1798, deductions were allowed on account of children, and an abatement was made of 5 per cent. to a person with children when the income was above £60 and under £100, and other rates of abatement were allowed according to the amount of income and the number of children; this indulgence extended to incomes of £5000 a year and upwards. But this is now all repealed, and there is no legislation as regards bachelors in any country in Europe.

BACHELOR OF ARTS. See ARTS, DEGREES IN.

BACILLUS. See BACTERIA.

BACKBONE. The backbone or vertebral column is the distinguishing characteristic of the highest division of the animal kingdom, hence called *Vertebrata* or *Vertebates*, that is "backboned animals." It has the bony cage of the ribs attached to it, and it bears the two pairs of limbs usually to be found in vertebrate animals, attached respectively to its upper and its lower bony rings or girdles, the shoulder-girdle and the hip-girdle (pelvis). Its lower end finishes with a tail, beyond the hip-girdle; and its upper end, above the shoulder-girdle, carries the head. The article *ARM* gives a sufficiently complete account of the shoulder-girdle in man and in the lower vertebrata; in the present article it will be necessary, therefore, to consider the backbone itself, the ribs, and the hip-girdle or pelvis.

This will be best done, as in other similar articles in this work, by beginning with a full description of the human anatomy of the parts, and then entering upon a comparative account of the distinctions between these structures in animals and in the human subject.

On reference to the Plates illustrative of this article, there will be found (Plate I.) illustrations of the human skeleton, excepting the limbs, as seen both from the front and the back, so that all the parts to be named can be traced with their natural connections. On Plate II, there are three views of the human backbone, all the appendages having been removed so that it can be seen more clearly, and the whole column being shown from the front, from the back, and from the right side. It is at once seen to consist of twenty-six vertebrae piled one above another, and is divided into four regions. The top seven are the *neck vertebrae*, *a*; the next twelve, *b*, are those of the *back*; five vertebrae form the *loins*, *c*, and are followed by the *os sacrum* or rump-bone, *d*, to which is fixed the *os coccyx* or tail-bone, *e*, the rudiment representing the tail-bones of the lower animals. The vertebrae of these various regions differ very much, as will be seen on reference to Plate II., where several vertebrae

are shown in various positions; but most of them have an irregularly shaped short cylindrical *body*, *a*, behind which (that is, further from the chest) is the spinal hole, *b*, through which runs the spinal cord. The vertebrae have generally seven processes, two transverse, *c c*, and one spinous, *d*, standing out from the arch at the sides and the back of the backbone, and used for levers by which the column may be bent by the muscles of the body; and the other four, the two articular surfaces of the upper side, *e e*, and those of the lower side, *f f*, serve to unite the several vertebrae of the column by linking them together, the surfaces *e e* being inclined backwards and the surfaces *f f* forwards, so as to interlock. Notches on each vertebra form, when two are together, little holes at the roots of these articular processes, and out of these holes the spinal cord shoots forth its spinal nerves.

Passing now to the consideration of the special characters of the vertebrae of each region, we find (Plate II.) that the ATLAS and AXIS, the first and second bones of the neck, have been already fully treated of in the articles bearing their names. The illustrations of them, taken together with one a little lower in the neck, show clearly the principal use of this region, which is mobility; the bodies of the vertebrae, *a*, are small, and their lever-processes, *c d*, large. Also the upper and under surfaces of the bodies are formed so as to allow greater extent of motion than in any other part of the backbone, the upper being hollowed from side to side, and the under from back to front, so that a chain-like junction is obtained and mobility is fully secured without loss of strength or connection. The transverse and spinous processes are each cloven, so that very small muscular effects can be obtained; and not hooked, so that free rotary motion is possible to a considerable extent.

The vertebrae of the back present marked differences. Here firmness is the great thing needful, in order that the ribs may have a firm support to work upon. The spinous processes, *d*, are now much hooked, overlapping one another like tiles, preventing altogether any rotatory movement, and admitting of very little movement sideways. The transverse processes, *c*, are bent backwards to give more room to the chest, and have articular surfaces, *k*, on which rest the angles of the ribs, the heads of which are jointed to the backbone in little round sockets formed by the junction of half-round hollows, one on each of two contiguous vertebrae, *l m*, so that two vertebrae combine to form the cavity in which the head of the rib turns. The first back vertebra, however, has a complete socket for the first rib, as well as a half-socket for the second rib; and the tenth has only one half-socket, because the eleventh and twelfth back vertebrae have complete sockets for the ribs of the same numbers.

The vertebrae of the loins allow of extensive motion; the trunk sways to and fro, backwards and forwards, by means of this region of the spine; and the body can be swung round as if the lower end of the backbone moved in a cup by a combination of movements, giving a motion resembling the rolling (not the turning) of the head upon the neck. The transverse processes, *c*, are short, and the articular processes, *f*, on the lower surface take a vertically cylindrical form, being received by the corresponding processes, *e*, of the upper surface of the next vertebra, which therefore are in the form of half of a hollow cylinder, a form specially suited to allow of rotatory motion. The spinous processes are short. The spinous hole, *b*, is large and somewhat triangular, to admit the branching out of the spinal cord immediately before its termination. The last vertebra is nearly immovable, its front edge bending over the os sacrum and its spinous process hooking over the spinal arch of the same bone.

The *os sacrum* is a large bone of a flattened pyramidal form, the point below. In the infant it is in five bones,

but in adults these are welded into one solid mass with slight indications to mark the original division. It has a large articular surface, *c*, on each side, for union with the pelvis, and the spinous processes of its originally separate bones are shown at *d d*. The articulations with the last vertebra of the loins are at *g e*, and that with the tail-bone (*os coccyx*) at *f*. The spinal canal continues between the body and the spinous processes, but is more or less open, like a narrow gutter.

The tail in man does not, as in many animals, project from the body, but it exists in four small bones which in the adult grow together, showing their former separation by slight markings. This bone has no canal for the spinal cord. The upper piece, *a b*, has a pair of small processes which connect its hind part more firmly to the os sacrum, but neither of the other pieces, *d e f*, has any process.

The backbone joints (Plate I.) are made by the connection of the bodies of the separate vertebrae by, *a*, cushions of "intervertebral substance," of fibro-cartilaginous nature, very tough at the outside but quite soft towards the centre; and *b*, the anterior common ligament which passes down the entire series of bones, and is spread out upon the surface of the os sacrum. The arches of the vertebrae are connected by the *ligamenta subflava*, or yellow substance, *g*, composed of thick, short, vertical, yellow fibres, extending from one vertebra to the next; they assist greatly, by their contraction, in restoring the erect position of the spinal column. The transverse and spinous processes of the vertebrae are also connected together by intertransverse and interspinous ligaments. Finally, the vertebrae are connected by their true joints, the articular surfaces *e* and *f*, already described.

The backbone assumes very different appearances in different positions. In front it seems as if made up, when closely examined, of three pyramids--the lower two connected by their tips, the upper two by their bases. From the lowest bone of the loins to the fourth or fifth of the back the bones diminish, and this is the tip of the lowest pyramid; then they widen to the lowest vertebra of the neck, and this is the base of the highest pyramid, to the top of which, the second vertebra of the neck (AXIS), the bones gradually diminish once more. Seen from the side the spinal column appears to undulate; a perpendicular dropped in the usual place touches only the front of the fourth and fifth neck-bones, and of the third and fourth loin-bones. These represent the extremes of two forward curves, above and below which the backbone recedes. The greatest recession is at the middle of the os sacrum, 2 inches from the perpendicular drawn. The object of these backward curves is to increase the size of the cavities opposite which they occur, and to aid in the balance of the trunk. The spinal canal, formed by the union of the spinal holes, lined by the yellow substance connecting the arches, follows the curves of the column, its form being triangular, the base towards the chest. It varies much in size in its course, because of the variation in the spinal cord. The greatest size of the canal is $\frac{3}{4}$ inch by $\frac{1}{2}$ inch in the neck; diminishing to $\frac{1}{2}$ inch in the back and rather less in the loins, and becoming much smaller in the os sacrum.

The pelvis or hip girdle (Plate II.) is a pair of bones of very irregular form, making an irregular bony ring attached at the back to the os sacrum, carrying the lower limbs and protecting some of the most important organs of the body, which lie within it. The upper part of the bone is fan-shaped, and forms the hip; it is the point of attachment of the great muscles preserving the vertical position of the trunk on the thigh bones, and contains the socket, *r*, of the hip joint. It has four little jutting processes, *a b c d*, and its upper margin, *e*, is called its crest. The outer surface, *f*, is called its back, and the inner, *g*, its belly--the latter being bounded by the ilio-pectineal line, *h*. This is the *ilium* or hip-bone, and is one of three pieces,

of which the pelvic bone is composed in infancy, though in the adult it is one solid mass. Following the hip-bone is the *pubic* or *haunch-bone*, which assists in forming the socket, *r*, and thence proceeds by *i* and *l* to its junction with its fellow of the other side in the *symphysis pubis*, *k*, which completes the girdle. The *os ischia*, or *share-bone* or *sitting-bone*, is the third portion of the pelvis, and carries the tuberosity, *m*, on which the body rests in the sitting posture. It completes the socket *r*, and has a spinous process, *n*, dividing its outline into two notches—the greater (*p*) and lesser (*o*) ischiatic curves.

The object of the "oval hole" of the pelvis, *q*, is to lighten the bone without diminishing its strength or surface. The spinal column and the pelvis are firmly connected by the *os sacrum*, the very slightest motion being possible, just sufficient to diminish any shock to the spinal cord. Strong ligaments, therefore, join these bones. The anterior sacro-iliac ligament is shown at *c*, and the posterior at *b* (see Plate I.). The anterior (*e*) and posterior (*f*) sacro-ischiatic ligaments join the tail-bone also, as well as the *os sacrum*, to the ischiatic part of the pelvis, thus forming complete holes with the curves of the latter bone already described at *p* and *o*, which serve for the passage of the muscles, bloodvessels, and nerves of the legs. The oval hole of the pelvis is filled with a ligament *h*, and the articulating surface where the ischiatic bones complete the ring of the pelvis by their junction is shown at *i*.

The pelvis gives a somewhat cylindrical cavity, the broad spread-out upper part of it, of a somewhat heart-shaped figure, being called the "false basin;" the "true basin," *h*, is below the brim, and is circular in the male and oval in the female. The front and sides of the true basin are formed by the pelvic bones, the back by the *os sacrum* and the *os coccyx*. It is evident, therefore, that it is not a complete bony ring, like the false basin, but is made of three bony angles depending about an inch from the brim of the pelvis, ending in the tail-bone and the tuberosities (*m*) of the ischiatic bone, on which the body rests when sitting.

The ribs form the movable bony framework of the chest-cavity. There are twelve pairs of them springing from the twelve vertebrae of the back in the manner described, and joined at their forward extremities to the breast-bone. The ribs vary considerably in form, and it may be seen on reference to the illustrations in Plate II. that the upper ribs approach the semicircular form, the middle are rather elliptical in shape, and the lower ribs are small arcs of large circles. No two ribs of the same side are equal in length; the seventh (from the top) is the longest. The ribs (except the eleventh and twelfth pairs) are doubly connected with the vertebrae, as indicated above—first by the head, *b*, and secondly by the tuberosity, *c*, at the "angle" of the body, *a*, which articulates with the corresponding surface on the transverse process of the vertebra. The last five pairs of ribs are not directly attached to the breast-bone, as are the first seven pairs by tough gristly continuations bearing the same shape with themselves, but the eighth, ninth, and tenth are similarly connected with the long seventh pair, and the eleventh and twelfth are free at the extremity, just tipped with cartilage to prevent injury to other parts. The first pair are nearly horizontal, but even in them the fore extremity droops a little, and successive pairs depend more and more as they approach the lower part of the chest.

The breast-bone (*sternum*) forms the middle front line of the chest; it is in three consecutive pieces, the lowest of which remains cartilaginous till very late in life. As the breast-bone presents some fancied resemblance to the short Roman straight sword (*ensis*), the cartilage of the breast-bone is sometimes called the "ensiform cartilage." The three pieces are very firmly but not rigidly connected. The upper piece or *manubrium* ("handle," that is, of the

sword) is shown at *a* in our illustration in Plate II., and is roughly triangular in form; it receives the two collar-bones on the hollow articulations at *d d*. It joins the second and longest piece, the *corpus* ("body," or blade of the sword), notched, like the first piece, with shallow hollows to receive the gristly ends of the ribs. The third piece, *c*, the *ensiform cartilage* (tip of the sword), completes the bone. The motion of the ribs will be fully described in the article RESPIRATION. The ligaments attaching the ribs to the spinal column are the intervertebral substance (*a c*), and the posterior (*d*), middle (*e*), and anterior (*f*) *costo-transverse* ligaments. The cartilages attaching the ribs to the breast-bone, as already described, assisted by the ligament *b* (*a* being the ligament tying together the pieces of the breast-bone itself), serve many purposes of elasticity, not the least of these being to diminish the shock of a blow upon the chest, which might otherwise fracture the ribs.

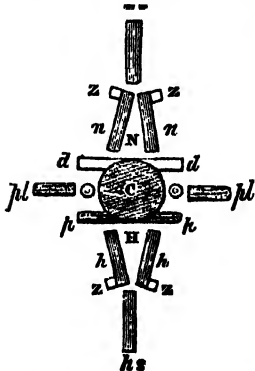
BACKBONE, in COMPARATIVE ANATOMY. As stated in the previous part of this article, the backbone is a characteristic feature which helps to mark off all the higher animals, the Vertebrates, from the lower, the Invertebrates. A vertebrate animal means one which possesses *vertebrae*, and *vertebrae* are the component parts of the backbone or spine. But, as a matter of fact, vertebrates do not all possess a backbone; and in order to understand why some few animals which have no backbone are yet classed with vertebrates, it will be well to consider how the backbone is developed in the embryo of any ordinary vertebrate.

At an early period in the development of the embryo, a groove appears in the centre of the germinal area, then the sides of the groove gradually rise, forming at first two ridges (*laminae dorsales*), and at last uniting above to form a tube. Within this tube appear the rudiments of the spinal cord. Before the ridges have united, the floor of the "primitive groove" becomes distinct as a collection of cells forming a gelatinous rod. This is the "notochord" (Gr. *notos*, back; *chordē*, cord), or "chorda dorsalis." From the sides of the ridges prolongations pass outwards and downwards (the ventral *laminae*); each of these splits into two leaves, and the lower leaves on each side tend to unite below and form a tube, as the dorsal *laminae* did above. Within this tube are formed the bloodvessels and digestive system. It is in the notochord separating the spinal cord from the visceral cavity that we have the rudiment of the backbone, and this primitive structure is always present in vertebrates, and is never found in the invertebrates. It is from the notochord also that the central part (the body or *centrum*) of each vertebra is formed. Fibrous bands radiating from the notochord are the bases of the remaining elements. Fig. 1, Plate III., represents a cross section through the back of a young sand-piper (*Pteromyzon branchialis*); *a* is the notochord; *b c*, inner and outer sheaths; *c**, the neural arch; *d*, the spinal chord; *e*, canal with fatty matter; *f*, a fibrous membrane, the analogue of the spinous process; *g*, diverging layers which, continued below, form the hæmal arch. In the simplest of all fish, the lancelet, the notochord remains gelatinous throughout life, and fibrous bands appear above the spinal cord. A higher stage of development is the conversion of the fibrous bands into cartilage, the notochord still remaining as an undivided gelatinous rod. This is the stage to which the sturgeon has advanced. Bony matter is deposited in the cartilage, so that the radiating elements are bony, while the notochord remains without further development; and this is the case with the lepidosiren and many fossil fish. The next step in development is the subdivision of the notochord into separate centra, the deposition of bony matter remaining more or less incomplete, as in sharks and rays. In fig. 2 (*Chimæra arctica*) *c* represents the series of cartilaginous rings inclosing the

notochord; *g*, the neural arch. In fig. 8 A N (*Acanthias vulgaris*, the spiny dog-fish), *a* is the conical cavity in front of the vertebra; *b*, the cavity behind; *n c*, connected by ligamentous collars; *w w*, the cartilaginous neural arch, which does not meet above, but there is a continuous ridge of elastic ligament upon which rise, *z z'*, horny spines; *γ*, the cartilage attached to *z z'*, upon which are fixed the accessory spinous processes, *f*, supporting the fin; *δ*, the cartilage in front of the hind dorsal fin. There are ribs of some length above the branchial arches, but they decrease till they disappear at the tail. In "bony fishes," which include most modern fishes, the ossification of the skeleton is complete. In the perch, for instance, the notochord has undergone segmentation into centra, and these have become bony with a cup-shaped cavity at each end. Such a vertebra is called *amphicelous* (Gr. *amphi*, on both sides; and *keilos*, hollow), and occurs also in some lizards—e.g. in the gecko.

The vertebrae are connected together by ligaments, and the cavities between each are filled with the gelatinous remains of the notochord. In this way the backbone is considerably strengthened, while the mobility necessary for quick movement in the water is still provided for. In the bony pike, alone of all fishes, the vertebrae are convex in front and concave behind—i.e. are *opisthocelous* (Gr. *opisthe*, behind).

The typical vertebra of Owen is represented in the woodcut. *x*, neural arch; *h*, hæmal arch; *c*, centrum; *n*, neuropophyses; *n s*, neural spine; *p l*, pleuropophyses; *h*, hæmapophyses; *h s*, hæmal spine; *d*, diapophyses; *p*, parapophyses; *z*, zygapophyses. The notochord, as we have seen, develops into the body or centrum of each vertebra; the dorsal ridges become the neural arches, from which spring the neural spines and side projections; and from portions of the ventral laminae are developed the hæmal arches (Gr. *haima*, blood), which inclose the bloodvessels, and are generally represented by the ribs, with the sternum (breast-bone)



and hæmal spines. Oken first pointed out that it was probable that the skull itself was composed of four altered vertebrae, and this brilliant generalization has been adopted by most anatomists, including Owen, though Huxley is not inclined to agree with them. The SKULL, however, as well as the Ribs, &c., will be considered elsewhere.

In Fishes the backbone is divided into only two regions, that of the trunk and the tail. The vertebrae of the trunk possess a neural arch, a neural spine, *f* (see Plate III., fig. 4), and two transverse processes, *h*, to which the ribs are generally attached. The neural spines become depressed towards the tail, and at last project beyond the tip of the backbone as a fan-shaped process upon which the rays of the tail-fin are articulated. The vertebrae of the tail have hæmal arches meeting below, inclosing the bloodvessels, and bearing the hæmal spines, *j*. In some sharks there are as many as 270 vertebrae in this region of the backbone. The bones (fig. 4) above the neural spines are no part of the backbone; it is to these "inter-spinous processes" that the dorsal fins are attached. The ribs in flat-fishes, and some others, become massed together at the hinder part of the belly. Little earthy matter is deposited in the bones, so that they are exceedingly flexible

and elastic, and well adapted for their movements in water.

Amongst the Amphibia, the Ophiomorpha have amphicelous vertebrae. The Urodela have the vertebrae of the back either amphicelous (fig. 3, *a b*) or opisthocelous (fig. 8, *b*), with very short ribs attached to the transverse processes; in axolotl the neural arches do not meet above. In frogs and toads the vertebrae of the back (dorsal) are hollow in front, or procelous (Gr. *pro*, in front); the ribs are rudimentary, and their place taken by long transverse processes (fig. 5); the neural arches are open above; the ninth vertebra (fig. 5, *e*) has large transverse processes for the attachment of the pelvic bones; and the vertebrae of the tail are united to form a single bone.

The skeleton of Reptiles never remains in a cartilaginous condition. In tortoises and turtles the vertebrae of the neck (cervical) and tail are alone free, those of the back being united into a single bone devoid of transverse processes; the neural spines and the ribs (fig. 6, *A, a*) are expanded into flat plates, which unite with one another by sutures, and form, together with horny plates in the skin, the well-known structure, the shell or carapace. The number of vertebrae in serpents may be more than twelve times the number in man, and they are all free. The dorsal vertebrae are procelous, with rudimentary transverse processes; there are numerous ribs, but no sternum. Fig. 7 is the python; *A, a*, the concavity in front of the vertebra, *b* that behind; the spinous processes are extensive. "The vertebrae of serpents articulate with each other by eight joints in addition to those of the cup and ball on the centrum, and interlock by parts reciprocally receiving and entering one another, like the joints called tenon-and-mortice in carpentry. . . . It is true that the serpent has no limbs, yet it can outlimb the monkey, outswim the fish, outleap the jerboa, and suddenly loosing the close coils of its crouching spiral, it can spring into the air and seize the bird upon the wing; all these creatures have been observed to fall its prey. The serpent has neither hands nor talons, yet it can outwrestle the athlete and crush the tiger in the embrace of its ponderous overlapping folds. Instead of licking up its food as it glides along, the serpent uplifts its crushed prey, and presents it, grasped in the death-coil as in a hand, to its slimy gaping mouth. It is truly wonderful to see the work of hands, feet, and fins performed by a modification of the vertebral column, by a multiplication of its segments with mobility of its ribs. But the vertebrae are specially modified to compensate, by the strength of their numerous articulations, for the weakness of their manifold repetition, and the consequent elongation of the slender column. As serpents move chiefly on the surface of the earth, their danger is greatest from pressure and blows from above; all the joints are fashioned accordingly to resist yielding, and sustain pressure in a vertical direction; there is no natural undulation of the body upwards and downwards, it is permitted only from side to side. So closely and compactly do the ten pairs of joints between each of the 200 or 300 vertebrae fit together, that even in the relaxed and dead state the body cannot be twisted except in a series of side coils" (Owen). The vertebrae of lizards are procelous, rarely amphicelous (Hatteria). There is a single transverse process at each side; the sacral vertebrae are never more than two, sometimes none. In all living crocodiles (Plate IV., figs. 1, 2) the vertebrae are procelous, but in fossil forms they are either amphicelous or opisthocelous; the front ribs of the trunk have forked heads, and there are ribs attached to the cervical vertebrae (fig. 2, 1, 3, c), which peculiarity prevents the animal from turning quickly. The first vertebra (fig. 2, 1) consists of four pieces—centrum (*a*), two side-pieces (*b b*), and a fourth piece (*c*), above. The second vertebra (2) is joined with the front of the next (3), thus presenting

The course of the men is from the extreme corner, from the ace-point (where the two pieces stand) of the adversary, along the board, and back along the nearer side to one's own ace-point, or at all events to the table containing it, called the "inner table." The players therefore play in opposite directions. In the game represented on previous page White plays from right to left along the further side, and from left to right along the nearer side, and Black plays just the reverse way.

The players each throw one die, the one who throws the highest number having the right to play first, and at his discretion to adopt for his first move the numbers turned up, or to throw both dice for himself. Each player then moves his own men from point to point, the number of points advanced being determined by the throws of the dice, and the object of each player being to move all his own men round to his own inner table, covering every point, and then to bear them or move them off. Whoever first bears his men wins a single game or hit, if his opponent has also borne any of his men. If he is able to bear all his men whilst his opponent has not borne a man, and at the same time has a man prisoner on the bar, he wins a double game or gammon; and if at the time he bears his last man the loser has one or more men still left in the first part of their course on the winner's inner table, it is a triple game or backgammon. When two games are won out of three it is called a rub, as in whist.

The interest of the game is maintained by one or two very simple devices. Thus no man can move to a point already covered by two pieces of the adversary. On the other hand, if there be a *blot*—that is, a point covered by only one man of the adversary—the player, if he is fortunate enough to reach that point by his throw, *hits* his adversary's man, and is entitled to remove it to the *bar* and occupy its place. The man hit has to remain out of play until there is a throw of such a number as carries it forward to an empty point on the opposite table, whence it recommences its career. This is a frequent and perplexing episode, and productive of much unexpected change of fortune.

BACKHUYSEN, LUDOLPH, a celebrated marine painter, born at Embden in 1631. Having been placed in the counting-house of a merchant at Amsterdam, his latent talent for painting was stimulated by the picturesque objects which the sea presented before the windows of his office, and his first delineations were of shipping, done with a pen in a style of extraordinary beauty and correctness. These drawings excited such surprise and admiration that it became a fashion to possess them, and they were sold at high prices. Backhuysen now determined on relinquishing his commercial pursuits and devoting himself to art, of the executive part of which he soon acquired a full mastery. Those subjects to which his genius particularly directed him were not to be found in the apartments of painters, or in the silence of academies. It was his practice to induce boatmen, by large rewards, to put to sea at times when no other person would venture from shore. Amidst the dash of waves, the roaring of breakers, and the danger of vessels, he sat making his sketches with perfect composure. He stamped, by this mode of study, a character of truth on his works which could have been obtained by no other means, and he acquired the rare distinction of forming a style peculiarly his own, which no rivalry has approached. His works possess, in the highest degree, the peculiar excellencies of the Dutch school—richness, transparency, delicate handling, and appropriate colour. Backhuysen had the good fortune to be appreciated in his own time. His works were eagerly sought after. He died in 1709.

BACKSHISH, a word of Persian origin, signifying "a present," but which has in modern times acquired the meaning of compulsory gratuity. In Turkey, Egypt, Asia Minor, and Syria the slightest service rendered by a native to a

traveller is invariably followed by a demand for backshish; and so widespread has the custom become that the ambassadors to the Supreme Porte are compelled to fee the door-keepers and officials every time they obtain an audience with the Sultan.

BACON, FRANCIS, LORD VERULAM, the youngest son of Sir Nicholas Bacon, was born at York House in the Strand on the 22nd of January, 1561, three years before Shakspeare, that is to say. In his thirteenth year he was sent to Trinity College, Cambridge, and studied with diligence and success. Lad though he was, the great queen delighted to try his quick wit, "conferring with him and proving him with questions: unto which he delivered himself with that gravity and maturity above his years that her Majesty would often term him 'the young lord keeper.'" On leaving Cambridge he entered Gray's Inn as a student of law. His attendance in London not being required for some years, by the regulations of his inn, Bacon went in the suite of Sir Amias Paulet, the British ambassador to the court of France. His work "Of the State of Europe," in which he arranged and estimated the information he collected during his visit to France, and which was written when he was nineteen years of age, displays conspicuously the industry, guided by deep penetration, which characterized his youthful mind. Returning to London on the death of his father, in 1579, he found himself the only one of his family left unprovided for. But his knowledge and industry soon worked out a course for his ambition.

On the 27th of June, 1582, he was called to the bar. His practice soon became considerable. In 1586, four years after, he was made a benchet. In his twenty-eighth year he became counsel-extraordinary to the queen. In 1588 he was appointed a reader to his inn; and again, in 1600, the *Lent double-reader*—appointments which showed the opinion of his professional acquirements held by those who were best able to judge of them.

Although connected with the most powerful family of Elizabeth's reign—the nephew of Lord Burleigh and the cousin of Sir Robert Cecil—his advancement corresponded neither to the natural influence of his talents nor the apparently favorable position in which he was placed by his connections. All that the Cecils ever procured for him was the reversion of the office of registrar of the Star Chamber—an appointment which, to use Bacon's comparison, "mended his prospect, but did not fill his barn." It was twenty years before he received the salary of £1600 per annum, connected with this situation. The exertions of Essex in behalf of Bacon were more hearty, but less efficient. The office of solicitor-general becoming vacant, Essex endeavoured to procure the place for his friend, and when baffled by the superior influence of the Cecils, he generously made him a present of Twickenham Park, worth about £2000 a year, and so beautiful a spot that Bacon called it "a Garden of Paradise." Essex made him this liberal present because he knew that Bacon's friendship for him had been a bar to his promotion. Bacon's zeal also in attaching his eldest brother to the interests of Essex, and braving the opposition of his own powerful relations in his cause, proves that, in this instance at least, selfish feelings did not influence his conduct. A coldness came over their friendship owing to difference of policy and opinion. Bacon in vain entreated Essex to desist from the proceedings which caused his ruin. They parted on bad terms in consequence. Bacon reckoned the last act of Essex no better than madness. His subsequent conduct to Essex has been held by some as utterly base; by others as the result of a stern necessity. It is difficult to explain away the fact that he appeared as counsel against his friend and benefactor, and accepted a large gift from the court for a garbled account of the "practices and treasons" of his former patron.

In 1592 Bacon was returned to Parliament for the county of Middlesex, and distinguished himself in the debates by taking the popular side, which ruined his favour with the queen; but as to his fellow-members, "the fear of every man that heard him was lest he should make an end," Ben Jonson tells us. In 1596 his most popular work, "Essays or Counsels, Civil and Moral," was published, and about the same time his "Maxims of Law." His circumstances at this time were very bad; he was disappointed in his attempts at forming a lucrative matrimonial connection, and twice arrested for debt. Upon the accession of James I. the fortunes of Bacon brightened. He had employed every art in order to make sure of his interest with the new king, writing to all the Scottish gentlemen of whom he possessed any knowledge to engage their influence and services in his behalf. His vigilance had its reward. On the 23rd of July, 1603, he was one of 237 gentlemen who received the honour of knighthood. His eloquence and information gave him great weight in the House of Commons. He continued to rise in spite of the opposition of Cecil, now Earl of Salisbury, and the powerful rivalry of Sir Edward Coke, the attorney-general. "The Advancement of Learning" was published in 1605. Two years afterwards he was made solicitor-general. He now published the groundwork of his "*Novum Organon Scientiarum*," his "*Cogitata et Visa*," and sent copies of it to his learned friends for examination and criticism. His next work, "The Wisdom of the Antients," was published in 1610. In 1613 he was appointed attorney-general, and made a member of the Privy Council; on the 7th March, 1617, he was made lord keeper of the great seal. In 1618 he reached the summit of his ambition in being appointed lord high chancellor of England, and created Baron Verulam. Next year he was made Viscount St. Alban's. Bacon chose this favourable moment for the publication of his "*Organon*." We have seen that it was the chief concern of his early thoughts and of his matured mind. In the midst of a rising career of professional, political, and literary effort, Bacon had been moulding and shaping his great work. It was wrought up and polished with the sedulous industry of an artist who labours for posterity. The reception of the work was such as, in the nature of things, must always be given to a production of its class—mingled ridicule and admiration.

After this the name of Bacon becomes tarnished. The ordinary apologies for him, the rapacity of his servants, and his connection with Buckingham, fail entirely in washing out the foul blot fixed upon him by the facts of his conduct. He was the victim of improvidence, a vice which gave him a perpetual craving for money to supply the wants which it created. Shortly after his elevation to the woolsack, one Wrenham, against whom he had decided a case in chancery, complained to the king, and though, when inquired into, the circumstances turned out in Bacon's favour, the industry and pertinacity of this individual excited suspicions in several quarters of the integrity of the chancellor. It is probable, too, that the worthless Buckingham had been offended by a remonstrance against one of his many illegalities (though Bacon begged pardon for his rashness on his knees), and had determined to give him up to the storm brewing against the court party, thereby trusting to save himself and his master the king. The House of Commons appointed a committee to inquire into the proceedings of the courts of law. The discussion in the Commons issued in referring the whole of the case to the Peers, the only authority competent to subject Lord Bacon to trial. The spirit of Bacon was crushed within him. There is something inexpressibly touching in the contrition which he expressed in the general confession which he first sent to the lords appointed to try him. This, however, did not satisfy the indignation of his judges. They demanded a particular confession of each charge by itself, a specification of the minute details of his meanness and guilt. This Lord Bacon sent, and when a

deputation of the Lords waited upon him to inquire if this paper was his own voluntary act, he replied, "It is my act—my hand—my heart. O, my lords, spare a broken reed." He was stripped of his offices, disqualified for public life, banished beyond the precincts of the court, subjected to a fine of £40,000, and to imprisonment in the Tower during the king's pleasure.

He was confined for a short time in the Tower, and then discharged. In the course of a few months he obtained a license to come for a time within the verge of the court. And, though this sentence was afterwards entirely commuted by the king, his ruined fortunes were never repaired, and we have seldom felt so painfully the degradation into which Bacon had sunk, as when reading the words of his pardon for all the frauds, deceits, impostures, bribes, corruptions, and other malpractices of which he had been found guilty. He was summoned to attend Parliament before he died; but the remainder of his days were spent chiefly in scientific pursuits, and the society of the friends whom adversity had left him. It is of his life at this time that Ben Jonson says, "My conceit of his person was never increased towards him by his place or honours. But I have and do reverence him for his greatness that was only proper to himself, in that he seemed to me ever by his work one of the greatest men, and most worthy of admiration, that has been in many ages. In his adversity I prayed that God would give him strength, for greatness he could not want." Bacon's works on natural history, his "History of Henry VII.," and some others, were published after his disgrace. He died in the house of the Earl of Arundel at Highgate, on the 9th of April, 1626, in his sixty-sixth year, of a cold caught through experimenting on the antiseptic power of snow. In his will he says, "My name and memory I leave to men's charitable speeches, to foreign nations, and to my own countrymen, after some time be passed over." Lord Bacon left no children.

Bacon found a vigorous defender against his critics in Mr. Hepworth Dixon, whose life of him is comprehensive and interesting; but by far the best biography of him is that of Spedding, of which the last volume appeared in 1875, and which, in spite of some defects, is a valuable contribution to English literature. It shows what learning and industry of the most conscientious kind has been able to effect in relieving from traditional disgrace the memory of consummate genius; and how far a trained, able, and honest hand could remove from the features of Bacon the dark colours in which they stand out in the satire of Pope and the sketch of Macaulay. Nor can it be disputed that Mr. Spedding's labours have largely increased our knowledge of his subject, and have cleared up much of what was before obscure in the career of the illustrious chancellor, or even in the contemporary history of England. Mr. Spedding places in clear relief the wisdom and sagacity of Bacon when, as attorney-general for James I., he tried to prevent or compose the disputes breaking out between the crown and the people; he does full justice to the attractive figure of the eloquent orator in the House of Commons; but he has hardly a word of censure for the time-serving courtier, who did not scruple to give his weighty sanction to acts of tyranny, injustice, and wrong, such as the execution of Raleigh, the extortion of Benevolences, and the other many disgraceful acts of a disgraceful reign; who never hesitated to become the instrument of the crooked designs of an ignoble master, and in whose character we see a combination of pliancy and meanness seldom equalled. His apology for Bacon and his view of the times are thus, in our judgment, incorrect; and, indeed, we believe that the true way to vindicate the memory of that great man is to treat his life in a very different manner. It is not by exaggerating his merits, by throwing into the shade his faults, by criticising minutely what has been alleged against them, that we shall form a just

estimate of Bacon's character, and even learn to excuse his failings; but by recollecting that intellectual grandeur is not necessarily accompanied by moral courage, and that one who was a giant in speculation was, as a man of action, more than ordinarily exposed to the corrupting influences of a servile age.

If Bacon, by nature morally weak, does not shine as a man of action, he was an estimable man in private life; he was hardly inferior in civil prudence, in statesmanship of the high contemplative kind, to the most distinguished men of any age, not to speak of his pre-eminence in philosophy. And in estimating his conduct we must not only make large allowances for the time in which he lived, but especially remember that we are not to measure his moral elevation by his intellectual gifts, and render his genius his accuser. Lord Bacon shared the noble Elizabethan fault of unlimited ambition—that “last infirmity of noble minds” which set Raleigh writing the “History of the World” on such a scale that he only reached to the second Macedonian war, which led Spenser to plan out the “Faery Queen” to more than twice the length of the fragment he lived to complete (and yet this fragment is the longest poem in the language), and which in Bacon's own case gave us the plan of the “*Instauratio Magna*,” sufficient for the lives of some dozen hard-working men.

Most of Bacon's works were written in English, but some in Latin, of which there are translations. A good edition of the whole is that by Mr. Basil Montague (sixteen vols., London, 1825–34); but the best, with a suitable commentary, life, notes, and illustrative matter, is that by Messrs. Spedding & Ellis (London, 1858–74). A masterly picture of the life and character of Bacon, combined with a keen and discriminating estimate of his power and influence as a thinker, is also to be found in the “Bacon” of Dean Church (one vol., London, 1884), which forms part of the celebrated English Men of Letters Series.

BACON, ROGER, the famous *Friar Bacon* of the middle ages, the pioneer of physical inquiry, whose name at length takes its place as first on the great roll of modern science, was born about the year 1214, since we know he died at about seventy-eight, in the year 1292. His age is that of Thomas à Kempis, Matthew Paris, Albertus Magnus, Raymond Lully, &c.

Roger Bacon was born near Ilchester in Somersetshire, of a respectable family. He was educated at Oxford and at Paris, which was then the first university in the world. After his return to Oxford in 1240 with a doctor's degree granted at Paris, he took the vows in a Franciscan convent at Oxford, on the persuasion, it is said, of Robert Grosstete, bishop of Lincoln.

The enmity of his monastic brethren soon began to show itself; the lectures on language and experimental philosophy which he gave in the university were prohibited, as well as the transmission of any of his writings beyond the walls of his monastery. The charge made against him was that of magic, which was then frequently brought against those who studied the sciences, and particularly chemistry.

In the meantime a pope was elected to whom we owe the production of the “*Opus Majus*.” This was Clement IV. (elected 1265), who had previously, when cardinal-bishop of Sabina, been legate in England. Here he had heard of Bacon's discoveries, and earnestly desired to see his writings; but the prohibition of the Franciscans prevented his wish being complied with. After his election as head of the church, Bacon, conceiving that there would be no danger or impropriety in disobeying his immediate superiors at the command of the pope, wrote to him, stating that he was now ready to send him whatever he wished for. The answer was a repetition of the former request; and Bacon accordingly drew up the “*Opus Majus*” of which it may be presumed he had the materials ready. It appears that he had mentioned the circumstances in which he stood;

for Clement's answer requires him to send the work with haste, any command of his superiors or constitution of his order notwithstanding, and also to point out, with all secrecy, how the danger mentioned by him might be avoided. The book was sent in the year 1267. Before the “*Opus Majus*,” Bacon, according to his own account, had written nothing except a few slight treatises, “*capitula quedam*.” Before he took the vows he wrote nothing whatever; and afterwards, as he says to Clement, he would have composed many books for his brother and his friends, but when he despaired of ever being able to communicate them he neglected to write. With the “*Opus Majus*” he sent also two other works, the “*Opus Minus*” and the “*Opus Tertium*,” the second a sort of abstract of the first, and the third a supplement to it. These exist in manuscript in the Cottonian Library, but have not been printed. What reception Clement gave them is not known. Some say he was highly gratified, and provided for the bearer; others, that he at least permitted an accusation of heresy against the writer. Both stories are unlikely, for Clement could hardly have received the work before he was seized with his last illness.

Till the year 1278 Bacon was allowed to remain free from open persecution; but in that year Jerome of Ascoli, general of the Franciscan order (afterwards pope under the title of Nicholas IV.), being appointed legate to the court of France, this was thought a proper opportunity to commence proceedings. Bacon, then sixty-four years old, was accordingly summoned to Paris, where a council of Franciscans, with Jerome at their head, condemned his writings, and committed him to close confinement. According to Bale the charge of innovation was the pretext, but of what kind was not specified; according to others, the writings of Bacon upon astrology were the particular ground of accusation. We cannot learn that any offer of pardon was made to the accused upon his recantation of the obnoxious opinions, as usual in such cases; which, if we may judge from the “*Opus Majus*,” Bacon would have conceived himself bound to accept, at least if he recognized the legality of the tribunal. A confirmation of the proceeding was immediately obtained from the court of Rome. During ten years, every effort made by him to procure his liberation was without success. The two succeeding pontiffs had short and busy reigns; but, on the accession of Jerome (Nicholas IV.), Bacon once more tried to attract notice. He sent to that pope, it is said, a treatise on the method of retarding the infirmities of old age, the only consequence of which was increased rigour and closer confinement. But that which was not to be obtained from the justice of the pope was conceded to private interest, and Bacon was at last restored to liberty by the intercession of some powerful nobles, but who they were is not mentioned. Some say he died in prison; but the best authorities unite in stating that he returned to Oxford, where he wrote a compendium of theology, and died some months after Nicholas IV.—that is, in 1292, according to Anthony à Wood, though other authorities give a later date. He was buried in the church of the Franciscans at Oxford. The manuscripts which he left behind him were immediately put under lock and key, and they are said to have been eaten by insects. To illustrate the narrowness of his order we quote an old monkish historian: “*Friar Bungay was profoundly versed in mathematics; which was either the work of Satan or of Roger Bacon.*”

It only remains for us to take a general view of the character of Roger Bacon's writings, and of the contents of the “*Opus Majus*.” This work is the only one to which we can appeal, if we would show that philosophy was successfully cultivated in an English university during the thirteenth century. It is of course in Latin, but in Latin of so simple a character that we know of none in the middle ages more easy to read; and it forms a brilliant exception to the stiff and barbarous style of that and succeeding times. He takes care to have both authority and reason for every

proposition that he advances; perhaps, indeed, he might have experienced forbearance at the hand of those who were his persecutors had he not so clearly made out prophets, apostles, and fathers to have been partakers of his opinions. Indeed the whole scope of the first part of the work is to prove, from authority and from reason, that philosophy and Christianity cannot disagree. His astrology and alchemy, those two great blots upon his character, as they are usually called, are, when considered by the side of a later age, harmless modifications, irrational only because unproved, and neither impossible nor unworthy of the investigation of a philosopher in the absence of preceding experiments.

The great points by which Bacon is known are his reputed knowledge of gunpowder and of the telescope. With regard to the former it is not at all clear that what we call gunpowder is intended, though some detonating mixture, of which saltpetre is an ingredient, is spoken of as commonly known. The passage is as follows:—

"Some things disturb the ear so much that if they were made to happen suddenly, by night, and with sufficient skill, no city or army could bear them. No noise of thunder could compare with them. Some things strike terror on the sight, so that the flashes of the clouds are beyond comparison less disturbing; works similar to which Gideon is thought to have performed in the camp of the Midianites. And an instance we take from a childish amusement which exists in many parts of the world, to wit, that with an instrument as large as the human thumb, by the violence of the salt called saltpetre, so horrible a noise is made by the rupture of so slight a thing as a bit of parchment that it is thought to exceed loud thunder, and the flash is stronger than the brightest lightning." ("Opus Majus," p. 474.)

With regard to the telescope it must be admitted that Bacon had conceived of the instrument, though there is no proof that he carried his conception into practice, or invented it. His words are these:—"We can so shape transparent substances, and so arrange them with respect to our sight and objects, that rays can be broken and bent as we please, so that objects may be seen far off or near, under whatever angle we please; and thus from an incredible distance we may read the smallest letters, and number the grains of dust and sand, on account of the greatness of the angle under which we see them; and we may manage so as hardly to see bodies, when near to us, on account of the smallness of the angle under which we cause them to be seen; for vision of this sort is not a consequence of distance, except as that affects the magnitude of the angle. And thus a boy may seem a giant, and a man a mountain," &c. The above contains a true description of a telescope; but if Bacon had constructed one he would have found that there are impediments to the indefinite increase of the magnifying power; and still more that a boy does not appear a giant, but a boy at a smaller distance. That the remarks of Bacon are derived from reflection and imagination only is further apparent from his asserting that a small army could be made to appear very large, and that the sun and moon could be made to descend, to all appearance, down below, and stand over the head of the enemy. The question has been agitated whether the invention of spectacles is due to Bacon, or whether they had been introduced just before he wrote. He certainly describes them, and explains why a plane convex glass magnifies.

The "Opus Majus" begins with a book on the necessity of advancing knowledge, and a dissertation on the use of philosophy in theology. It is followed by books on the utility of grammar and mathematics; in the latter of which he runs through the various sciences of astronomy, chronology, geography, optics, and music. Under the name of mathematics was included all the physical science of the time. "The neglect of it for nearly thirty or forty years hath nearly destroyed the studies of Latin Christendom. For he who knows not mathematics cannot know any other science,

and what is more he cannot discover his own ignorance, or find its proper remedies." And in another place he says that this neglect of mathematics must be the work of the devil—"Et hoc diabolus procuravit quatenus radices sapientiæ humanæ ignorarentur"—the devil's object in this being to prevent the sources of human wisdom from becoming known. The account of the inhabited world is long and curious, and though frequently based on that of Ptolemy or the writings of Pliny, contains many new facts from travellers of his own and preceding times. His account of the defects in the calendar was variously cited in the discussions which took place on the subject two centuries after. The remainder of the work consists of a treatise on optics and on experimental philosophy, insisting on the peculiar advantages of the latter. The explanation of the phenomena of the rainbow, though very imperfect, was an original effort of a character altogether foreign to the philosophy of his day. He attributes it to the reflection of the sun's rays from the cloud; and the chief merit of his theory is in the clear and philosophical manner in which he proves that the phenomenon is an appearance and not a reality.

The "Opus Minus," "Opus Tertium," with other writings of Bacon, were published by Brewer (London, 1859); but there are many others which have never been printed, and of which the manuscripts are preserved in the British Museum, Bodleian Library, and in some of the libraries of the Continent. The best edition of the "Opus Majus" is that by Jebb (London, 1733); and the best general survey (French) of Roger Bacon's life and works is that by M. Emile Charles (Paris, 1861).

BACTERIA. In all animal and vegetable infusions which have been left exposed to the air for a short time there will be found, under high powers of the microscope, minute bodies of various forms, some round, others oblong, and others shaped like a cork-screw. These are called by the general name of *Bacteria*. The smallest are perceived with difficulty under the best microscopes, and are certainly not more than $\frac{1}{100000}$ th of an inch in diameter; the largest are not thicker than $\frac{1}{10000}$ th of an inch, though they are long in proportion, varying from $\frac{1}{30000}$ th to $\frac{1}{300}$ th of an inch. They multiply by lengthening, and then dividing across. The divided portions then either separate or remain united in bead-like rows. Sometimes they form a jelly-like mass, and this is called the *zooglaea* stage of their existence. If a fluid be prepared of a definite chemical composition (e.g. Pasteur's fluid), and infected by touching it with the point of a needle previously dipped in an infusion containing Bacteria, it will be seen that the fluid soon becomes milky, and, examined under the microscope, is swarming with Bacteria. The chemical composition of the fluid is altered, and this building up of their own bodies—this reconstruction of various diverse substances—proves that the Bacteria are living beings. This is also proved by their power of motion. There are two kinds of movements, which must be carefully distinguished. One is a quivering motion, which is also exhibited by lifeless and inorganic matter. This is the movement called Brownian, after the great botanist Robert Brown, who first discovered it. It may readily be seen by rubbing down gamboge in water. But the motion which helps to prove that Bacteria are living, is one of translation—a motion from one place to another. Does this also prove them to be animal? Not necessarily, for minute forms, universally acknowledged to be plants, move from place to place. Bacteria flourish in "Pasteur's fluid," and better still when the sugar is left out; and Cohn has shown that they obtain the nitrogen of their bodies from the ammonia of the fluid, and their carbon from the tartaric acid. Now, animals are unable to do this; they require much more complex compounds than tartrate of ammonia; in fact they can only live on substances elaborated by plants or other animals. Bacteria, on the other hand, differ from green

plants in not being able to take their carbon from carbonic acid, but agree with fungi in requiring carbo-hydrates and their derivatives. The growth of Bacteria, in setting up a chemical process, is the cause of putrescence.

Professor Tyndall for many years carried on a series of very skillful and patient experiments, which proved amongst other things that the air contains the germs of Bacteria. He was engaged in the investigation of the chemical action of light upon vapours, and it was necessary to obtain air free from those floating particles, not perceived in ordinary diffuse daylight, but at once revealed by a beam of sunlight or by a concentrated beam of electric light. A spirit-lamp placed beneath such a beam causes an appearance as of volumes of dense black smoke rolling up through the beam; but there is no actual smoke: the appearance is due to the burning of the atoms, which reflect the sunlight and so make it visible. The blackness is that of stellar space—a want, not of light, but of material to scatter the light. The same optically pure atmosphere was obtained by allowing a closed chamber to remain at rest until the atoms subsided. It was in this way that Professor Tyndall showed so conclusively that the power of developing life by the air went hand in hand with its power of scattering light. He prepared air-tight chambers or cases, coated inside with glycerine, each with a glass front, windows in the sides, and test-tubes fixed in the bottom. At first a concentrated beam of light, passing through, showed the air within to be laden with atoms. After three days this floating matter had settled upon the sides and bottom, and was retained by the glycerine. The track of the beam, evident enough on each side of the box, was quite lost to view while passing through it. The scattering of the light was thus shown to be due, not to the air itself, but to foreign matter suspended in it. Infusions of various animal and vegetable substances were introduced into the test-tubes, precautions being taken to prevent the entry of floating matter. The infusions were then boiled in order to kill any germs which they might contain; and this done, the infusions remained pellucid ever after, unless indeed air was admitted. Similar infusions left exposed to ordinary air soon swarm with Bacteria. The floating atoms of the air are quite invisible under the microscope, but their presence is at once made manifest by a concentrated beam of light. It is evident that amongst these are the germs from which Bacteria develop, for when they are admitted to an infusion Bacteria swarm within a short time, and so long as they are excluded no sign of life appears. Thus the air, when placed under proper conditions, undergoes a process of self-purification, and when this purification is visibly complete the power to scatter light and to generate life disappear together. In order to investigate the distribution of germs in the air, Professor Tyndall prepared a tray into which were fixed 100 tubes, filled with infusions. From the irregular manner in which the tubes were attacked by Bacteria, he inferred that as regards *quantity* the distribution of the germs in the air is not uniform. The singling out, moreover, of one tube of the hundred by the particular Bacteria that develop a green pigment, showed that as regards *quality* the distribution is not uniform. The same absence of uniformity was manifested in the struggle for existence between the Bacteria and the common blue-mould (*Penicillium*). In some tubes the former were triumphant, in others the latter. It would seem also as if a want of uniformity prevailed as regards *vital vigour*. The motions of the Bacteria in some tubes were exceedingly languid, while in others they resembled a “rain of projectiles,” being so rapid and violent as to be followed with difficulty by the eye. Professor Tyndall concludes that the germs float through the atmosphere in groups or clouds, with spaces between them more sparsely filled. The germs are universally present in water, as Dr. Burdon Sanderson has demonstrated, and Professor Tyndall has obtained

germs from the centre of a block of ice. The germs in water are in a very different condition as regards readiness for development from those in the air. In water they are thoroughly wetted, and ready under the proper conditions to pass rapidly into the finished organism. In air they are more or less desiccated, and require a period of preparation, longer or shorter, to bring them up to the starting point of the water-germs. Both want an excess of oxygen kill not only the Bacteria, but also the germs. “The fully-developed bacterium is demonstrably killed by a temperature of 140° Fahr. Fixing the mind’s eye upon the germ during its passage from the hard and resistant to the plastic and sensitive state, it will appear in the highest degree probable that the plastic stage will be reached by different germs in different times. Some are more indurated than others, and require a longer immersion to soften and germinate. For all known germs there exists a period of incubation, during which they prepare themselves for emergence as the finished organisms which have proved so sensitive to heat. If during this period, and well within it, the infusion be boiled for even the fraction of a minute, the softened germs which are then approaching their phase of final development will be destroyed. Repeating the process of heating every ten or twelve hours, before the least *sensible* change has occurred in the infusions, each successive heating will destroy the germs then softened, until, after a sufficient number of heatings, the last living germ will disappear. Guided by the principle here laid down, and applying the heat discontinuously, infusions have been sterilized by an aggregate period of heating, which, fifty times multiplied, would fail to sterilize them if applied continuously. Four minutes in the one case can accomplish what four hours fail to accomplish in the other. If properly followed out, the method of sterilization here described is infallible. A temperature, moreover, far below the boiling-point suffices for sterilization.” (Tyndall.)

Professor Tyndall has thus amply proved the existence in the atmosphere of the germs of Bacteria so minute that the most powerful microscope does not reveal them. Mr. H. C. Sorby, president of the Royal Microscopical Society, shows, as the result of elaborate calculations, that “a sphere of organized matter one-tenth of the diameter of the smallest particle that could be clearly defined with our highest powers, might contain 1,000,000 molecules of albumen and molecularly combined water. Variations in number, chemical character, and arrangement would in such a case admit of an almost boundless variety of structural characters. The final velocity with which such extremely minute particles would subside in air must be so slow that they could penetrate into almost every place to which the atmosphere has access.”

These considerations are all-important in investigating the germ-theories of fermentation, putrefaction, and infection, and the hypothesis of spontaneous generation.

Ehrenberg distinguished between the chief forms of Bacteria, such as *Bacterium*, *Vibrio*, *Spirillum*, *Spirochæte*. Cohn marks them off from other minute organisms of the same family (*Selcizomycetes*) by defining them as “cells without chlorophyll, of spherical, oblong, or cylindrical form, sometimes twisted or bent, which multiply themselves exclusively by transverse division, and occur either isolated or in cell-families.” He divides them into four tribes:—

1. *Sphaerobacteria*, extremely small, roundish cells, occurring either singly or in rows. There is only one genus, *Micrococcus*, but several species. Some of these are found as gelatinous growths on dead organic bodies; others occur as stains of different colours, orange, blue, &c. *Micrococcus prodigiosus* is the cause of the “blood-stain” on bread. Other species again are connected with diseases, e.g. *Micrococcus dipthericus*, *Micrococcus septicus*, *Micrococcus racineus*.

2. *Microbacteria* are long, rod-like cells, very minute,

and able to swim about in fluids. They are either separate or united in short rows of cells from two to eight in number. Fluids containing albuminoids putrefy and become milky. *Bacterium termo* is the common bacterium of putrefaction. *Bacterium aeruginosum* is the ferment of blue-green pus.

3. *Desmobacteria* are longer cells than the Microbacteria, remaining united in threads, and swimming freely. The threads are either straight (*Bacillus*) or bent at the joints (*Vibrio*). *Bacillus subtilis* is the butyric ferment; *Bacillus anthracis*, the pathogenous ferment of the disease known as "the blood" and "malignant pustule." *Vibrio* seems to have a motion like a serpent, but this appearance is due to rotation on its axis.

4. *Spirobacteria* are spirally curved bodies without joints, sometimes of considerable size in comparison with the other tribes. *Spirillum volutans* is a giant among Bacteria. It is possible to observe the cilium (or fine lashing thread) at each end of the screw. Spirochæte is like *Spirillum*, but longer and with the twists closer together.

Cohn's classification, though a great advance on Ehrenberg's, can, however, only be regarded as temporary. It is very artificial, and does not take into account many points in connection with the natural history of these organisms which have of late been made out. A great deal of discussion has taken place as to whether there are distinct species of these organisms, or whether they may not be transmutable into one another. Judging from the weight of evidence with regard to those which have been isolated and studied separately, it seems that there are a number of different species, or at least of varieties, which do not pass into one another, but remain as distinct varieties, retaining more or less their special properties under varying circumstances.

Of late years great progress has been made in the methods of cultivating Bacteria. They may be grown in various fluids, such as animal or vegetable infusions, or even in solutions containing phosphates, tartrates, and sugar (Pasteur's, Cohn's, and Bergmann's solutions). Solid materials have, however, great advantages over liquids, and hence it is usual now to add sufficient gelatine to the infusions to solidify them, or if it is necessary to keep them at a temperature at which gelatine would become fluid, solidified blood serum is employed. The advantages of the solid material are great, more especially as an aid to the separation of the various forms of Bacteria from one another. For example, if one wishes to know how many and what kinds of Bacteria are present, say, in a particular specimen of water, one takes a tube containing gelatinized meat infusion, liquefies the infusion by warming it to 100° Fahr., puts in a drop of water, shakes the tube, and then allows the gelatine to solidify. After one or two days minute spots appear at various points of the gelatine, consisting of colonies of Bacteria. By counting these points one ascertains the number of Bacteria in the original drop, for if the gelatine and the water were well mixed each colony corresponds to a single bacterium, and by examining the various colonies one can also tell what varieties were present. If the drop had been added to a fluid the Bacteria would have become mixed together, and the most vigorous forms would have prevented the growth of the weaker. The numerous advantages of this method are self-evident.

Bacteria are not only associated with various fermentative changes in fluids, but they also stand in a causal connection with various diseases. This they do in two ways—either by producing changes in the fluids in which they grow, leading to the formation of poisonous products; or by growing in the blood or tissues of animals, and thereby leading to disease and death. The dangers of wounds—accidental or operation wounds—are in the main due to Bacteria acting in one or other of the ways mentioned. Growing in a wound, they break up the albuminous materials and lead to the production of a substance termed sepsin or pyrogen, which, absorbed into the blood, poison

the patient, causing fever, or, if in large amount, death, with symptoms of collapse. On the other hand, they may enter the circulation, and developing there, cause the patient's death from septicæmia or pyæmia. That the products of the growth of Bacteria in albuminous fluids are of themselves poisonous was long ago made out by Panum, who found that putrid fluids, boiled and filtered so as to get rid of all Bacteria, still caused fever, and, if injected in large quantities, the death of the animal. Bergmann was able to separate a substance from these fluids which was soluble in water, and produced when injected into animals the same symptoms as the original putrid fluid. Of late Koch has found that if a large quantity of putrid material was introduced into animals they died very quickly, as described by Panum, but if the quantity was small the majority remained unaffected, while a small proportion died after a day or two. The minutest portion of blood from an animal which had died inoculated into another animal of the same species infallibly caused its death in twenty-four to thirty-six hours. The blood of these animals, when dried on a piece of glass and stained with certain aniline dyes, showed the presence of numerous Bacteria, all apparently of the same kind. Koch was able to cultivate these Bacteria on gelatinized meat infusion or solidified blood serum, where they grew in large colonies, and could be transferred from one flask to another without undergoing any change in form or characters. The minutest quantity of these Bacteria, cultivated in this way and inoculated into an animal, produced the original disease in its full virulence. Such experiments prove absolutely that the Bacteria growing in the blood were the real cause of the disease. In a number of instances similar proof that Bacteria are the cause of disease has been furnished, such as splenic fever, septicæmia in mice, chicken cholera, septicæmia in rabbits, malignant œdema in guinea-pigs, and tuberculosis in the lower animals.

Splenic fever is due to the growth of a bacillus in the blood, which is called the *Bacillus anthracis*. It is by far the largest of the known pathogenic Bacteria, and one of the most deadly. These bacilli grow in enormous numbers in the blood of the affected animals, and are found after death filling all the capillaries of the body. The animals affected bleed at their nose and mouth, and die in a few hours. These bacilli, when growing exposed to air, produce oval spores which are extremely resistant, and can be exposed to high temperatures and the action of many germicides without losing their vitality. When placed under suitable conditions (heat and moisture) they sprout and grow to the long bacillus form.

Malignant œdema is a disease where bacilli grow in the cellular tissue, not in the bloodvessels, and cause inflammation and the rapid death of the animal. These bacilli are shorter than the *Bacillus anthracis*, and cannot grow in the presence of oxygen. They also produce spores. *Septicæmia* in mice is due to the development of minute delicate bacilli in the blood. These have been cultivated on blood serum, and probably also produce spores. *Septicæmia* in rabbits is caused by the development of small oval Bacteria in the blood. *Chicken cholera* is caused by small Bacteria which are thickened at each end, so that when they are not stained they look like figures of eight. They develop in enormous numbers in the blood. They are cultivated in chicken broth, and in a short time they fall to the bottom, leaving the fluid clear. These special Bacteria can then no longer develop in this fluid, though other forms grow readily. The conclusion, therefore, is that they have exhausted some special material in the broth, without which they cannot grow. Similar phenomena are well known in disease. A patient who has had one attack of measles, scarlet fever, or small-pox is rarely subject to another, and the probability is that some material which is necessary for the growth of the cause of the disease has been exhausted, and is not reproduced.

Quite recently considerable excitement has been raised by the discovery by Dr. Koch of Berlin of a bacillus which is apparently the cause of tuberculosis, at least in the lower animals. In 1866 Villemin showed that tubercle could be inoculated from man to animals. The introduction of portions of phthisical lungs and other tuberculous materials under the skin of the lower animals, was followed by the development of a disease resembling acute tuberculosis in man. Numerous investigations which have been carried on since that time confirm the truth of these statements, and have led observers to search for some bacterium as the probable cause. This was discovered by Koch in 1882 in the form of a minute bacillus, which stains in a peculiar and distinctive manner with various aniline dyes. He was able to cultivate it on solidified blood serum, and to demonstrate in this way that it was the cause of the disease in the lower animals. It has also been found that these bacilli are present in the sputum of phthisical patients, and in this way a diagnosis may be made at a very early stage of the disease. The importance of this discovery can hardly be over-estimated, and there is little doubt that ere long a remedy will be found against this terrible scourge.

These are not the only diseases of which Bacteria are the cause, but their relation to other diseases has not yet been clearly proved by cultivation of the Bacteria outside the body and subsequent reproduction of the disease by inoculation with the isolated bacterium. In *relapsing fever* spiral organisms, termed spirilla, are present in the blood during the height of the fever and at each relapse. The blood of patients suffering from the fever is infective, and causes in man and in monkeys similar symptoms, accompanied by the presence of spirilla in the blood. In *typhoid fever* a definite form of bacillus is found in the walls of the typhoid intestinal ulcers, and also in the capillaries of the body, especially in the liver and kidneys, where they form masses. In *leprosy* the leprosy nodules are crowded with minute bacilli resembling closely the tubercular bacilli, with slight differences in their mode of staining and in their general appearances. In fatal cases of *small-pox* the capillaries are often found filled with plugs of micrococci, and vaccine matter contains similar micrococci. It is not yet proved, however, that the micrococci are the cause of small-pox or of the vaccine pustule. The facts which we have already mentioned, and the natural history of disease, lead us to expect that the cause of all infectious diseases will be found to be Bacteria or allied organisms; and when these are discovered it may be hoped that means will be found to prevent their entrance into the body, or to destroy them after they have entered.

Facts have already been made out which lead us to hope that for some diseases at least methods of inoculation may be introduced which will prevent animals from contracting the affection. Pasteur found that the Bacteria of fowl cholera when grown under certain conditions lost their virulence, and did not cause fatal results when injected into other fowls. The animals inoculated with this attenuated virus were found to be protected against the disease even when the most virulent material was injected. The conditions for "attenuation" of the virus were exposure of the Bacteria during their growth to oxygen, and to a temperature of about 108° Fahr. About the same time Toussaint discovered a method of inoculation for splenic fever, which in like manner protected the animal from a virulent attack. He heated the blood to 126° Fahr. for from five to ten minutes, and found that after injection of this blood the animals were protected. Various degrees of strength of the attenuated virus could be obtained by varying the length of time that the blood was heated. As the results obtained by this method were somewhat uncertain, Pasteur took up the investigation, and found that by cultivating the *Bacillus anthracis* in the same way as he had done the bacterium of fowl cholera an attenuated virus was in like

manner obtained. Great hopes were at first entertained that by inoculation of animals with this attenuated virus this great scourge would be eradicated, but these hopes have hardly been realized. It has been found that only sheep, and possibly also cattle, are protected in this way, but that horses and other animals are not rendered immune. It has also been found that in order to render sheep completely immune a virus of considerable strength must be used, and that a certain number (about 10 per cent.) of the sheep die after this inoculation. As, however, a much smaller percentage die in this country from the natural disease, the general introduction of protective inoculations would not offer any advantages. But splenic fever tends to occur chiefly in certain localities, and on farms where the disease is present a much larger proportion than 10 per cent. die. In this case the protective inoculation of the animals, though accompanied with a certain amount of loss, would on the whole be a great gain to the farmer.

These low forms of life are also of great interest to the agriculturist. Cereals and other crops get the nitrogen which forms part of their substance from the nitrates present in the soil. The nitrates are formed from the nitrogenous compounds which exist in the shape of decaying animal and vegetable matter. This process of "nitrification" was thought by Pasteur twenty years ago to be due to the action of some living organism. Miesel showed that water containing nitric acid, and originally free from ammonia and nitrites, contained these compounds after being subjected to the action of Bacteria. Within the last few years Schlösing and Müntz have conducted experiments (confirmed by Warrington) which prove that nitrification in the soil is due to Bacteria, for purely inorganic soil does not act, and antiseptic vapours put a stop to the action.

The fermentation of wine, beer, and other such liquors is not due to Bacteria, but to other vegetable organisms. See FERMENTATION.

BACTRIA or **BACTRIA'NA**, the ancient name of a district which, though its boundaries cannot now be stated with certainty, coincided somewhat with the modern **AFGHAN TURKISTAN**. The river Oxus was the boundary between Bactria and Sogdiana, which lay to the east of Bactria, and was possessed by the Greek kings of this province (Strabo, p. 517). The northern boundary of Bactria was indefinite, and the western was Margiana. These limits, which mark the extent of Bactria as a province or satrapy, do not of course correspond with the more extended limits of the Greek Bactrian kingdom. The province of Bactria was a territory of great extent, partly barren and waste, but in many parts of great fertility, watered by the Oxus and its tributary streams, and peopled by a brave and hardy race, who were reckoned among the best soldiers in the service of Persia after Bactria became a Persian province. The chief city was Bactra, called also Zariaspa, situated on the Bactros, one of the tributary rivers of the Oxus. Of Bactria little is known prior to its subjugation by the Macedonians under Alexander the Great. In the reign of Darius I. the Bactrians paid a tribute to that monarch of 360 talents. In the time of Xerxes there were Bactrians in the army which he led against Greece, who were under the command of Hystaspes, a son of Darius by Atossa, a daughter of Cyrus. The province continued to be governed by the satraps of Persia down to the time of Darius Codomanus. In the final overthrow of that king by Alexander the Great, at the battle of Arbela, there was a body of Bactrians in his service, who were under the command of Bessus, the satrap of Bactria. After the conquest of Bactria by Alexander, he built a city which he gave to his Greek mercenaries and to such of the Macedonians as were unfit from age or wounds for longer service. Such was the foundation of the Greek colony of Bactria, to which volunteers from the

neighbouring countries were admitted. This, however, was not the earliest settlement of Greeks in Bactria; for the first Darius transplanted there a number of Greeks from Barce, in Africa (Herod. iv. 204); and the Branchidae also, from Ionia, were planted here by Xerxes I. (Strabo, p. 517). From the death of Alexander, 323 years B.C., to 255 B.C., Bactria constituted part of the possessions of Seleucus and his successors, and was governed by their satraps. About the last-mentioned date Theodotus, in the reign of Antiochus II. of Syria, assumed the government, and founded an empire which lasted about 120 years.

BAC'TRIS, a genus of *Palms* consisting of about forty species, found on river-banks, in marshy places, and on the sea-coast in tropical America. Their trunks are usually of moderate height or even dwarfish, but a few species grow to the height of 40 feet. They are usually found in dense patches, forming impassable thickets, on account of the numerous long, hard, black spines with which the stem is protected. Their wood is generally hard and black towards the outside, but pale yellow internally, with black fibres. Their leaves usually grow all over the surface of the stem, instead of being confined to the summit only. They have extremely spiny stalks, and the leaves are either pinnate, after the manner of the date palm, or merely consist of two broad, sharp, diverging, plaited lobes. The fruit is small, soft, with a subacid rather fibrous pulp, inclosed in a bluish-black rind, and affords a grateful fruit to small birds. The Maraja palm is the species *Bactris maraja*, 40 or 50 feet high, and noted for its large clusters of fruit, which is highly esteemed in its native country, Brazil.

BAC'ULITES, a genus of many-chambered cephalopods belonging to the family of *AMMONITES*. Baculites is only known in a fossil state, and is abundant in the chalk of Normandy, which has in consequence received the name of *baculite limestone*. The shell is straight, more or less compressed, conical or rather tapering to a point, and very much elongated. The aperture is guarded by a dorsal process. The chambers are sinuous and pierced by a marginal siphon, and the last is several inches long.

BAC'UP, a prosperous town of Lancashire, on the Irwell, 211 miles from London, and 15 from Manchester. It contains numerous churches, cotton factories, dye-works, brass and iron foundries, a mechanics' institute, and a fine market hall, opened in 1867. It is surrounded by coal mines. The population in 1881 was 25,031—an increase of 8000 from 1871.

BADAG'RY is a town and district in the British colony of Lagos, on the west coast of Africa. The town stands in about 6° N. lat., 3° 30' E. lon. It is 6 or 7 miles from the shore, on the banks of the western branch of the Lagos, which a natural canal mixes with the sea. The town contains about 10,000 inhabitants. The houses are chiefly constructed of bamboo cane, and are only of one story. The market is well supplied with poultry, yams, maize, palm-wine, country cloth, &c. The town is the residence of an English civil commandant and subcollector of customs. Captain Clipperton and Richard Lauder began their journey from Badagry on their expeditions into the interior of Africa.

BADAJOZ, a city in Spain, the capital of a province of the same name, which was formed out of the southern half of the old province of Estremadura. It was called *Par Augusta* by the Romans, and *Beleddaz*, or "land of health," by the Moors. It is situated in a vast plain, at the confluence of the Guadiana and a small stream called Rivillas, is about 5 miles from the Portuguese frontier, and is one of the chief stations on the railway from Madrid to Lisbon. The population in 1883 was 24,000. The town is the seat of a bishop and the residence of the governor of Estremadura. The cathedral, which is bomb-proof, contains a magnificent organ. There are no fountains in the town, but a great number of wells and cisterns. The streets are

regular and clean, but very narrow. The soil of the surrounding country is very fertile, and produces abundantly grain, fruit, wine, and oil. Leather, soap, and coarse woollens are manufactured. The castle or tower, which is built on a calcareous rock 300 feet above the level of the Guadiana, and on the south side of it, commands both the town and the confluence of the two rivers. On the north-west of the town a granite bridge crosses the Guadiana; it has twenty-eight arches, and is 1874 feet in length and 23 wide. The fortifications of Badajoz are strong, as are also the outworks. Several forts surround the town; one, San Christoval, on the opposite side of the Guadiana, stands upon a rock overlooking the interior of the town, and is connected with the bridge-head.

Badajoz, as a frontier fortress, has been often subjected to sieges, and more than once changed masters with the Moors, Portuguese, and Spaniards. In 1808 it was garrisoned and held against the French, who in vain summoned it to surrender, and also again in 1809; but in 1811 Marshal Soult besieged it from January till 2nd March, when, the governor Menacho being killed, his successor gave it up in a cowardly manner within ten days. In the course of that year two attempts were made by the allied English and Portuguese army to storm the place, but both failed. On the 16th of March, 1812, it was again invested by the Duke of Wellington. The attack was carried on with unremitting vigour and most consummate skill till the 6th of April, when, breaches having been made which were deemed practicable, a general assault was ordered, which, after a most destructive and desperate conflict, was successful, though at an expense in killed and wounded on the British side of nearly 5000 men. Unhappily the lustre of this brilliant action was tarnished by the desperate and wild rage of the soldiers.

BADAKSHAN. See *AFGHAN TURKESTAN*.

BADALO'NA, a town in Spain, 6 miles N.E. of Barcelona. It is beautifully situated near the sea, and enjoys an excellent climate. Population, 9000.

BAD'EN. The grand-duchy of Baden extends with very irregular breadth along the right bank of the Rhine in its upper course, from S. to N., and is situated between 47° 31' and 49° 47' N. lat., and 7° 30' and 9° 40' E. lon. It is more than equal to Saxony in extent, but much below that kingdom in point of population. The length of Baden is about 180 miles in a straight line from N. to S.; the breadth varies from 14 to 100 miles. Its southern limits on the side of Switzerland are formed by the Boden See, or Lake Constanx, and the Rhine; on the W. the Rhine separates it from Alsace and Rhenish Bavaria; on the N. and E. it is bounded by Hesse Darmstadt, Bavaria, and Württemberg.

Baden has an area of 5851 English square miles, with a population of 1,570,196. It is divided into four districts as follows:—

	Area in English square miles.	Population in 1881.
Seckreis (Constanz), . . .	1,679	282,338
Upper Rhine,	1,830	454,202
Middle Rhine,	993	406,938
Lower Rhine,	1,349	426,718
Total,	5,851	1,570,196

Physical Character and Climate.—The larger part of Baden is of a mountainous or hilly character; it is interspersed with fertile and pleasant valleys, but contains no considerable plain, except the almost uninterrupted rich and beautiful level which, lying on the right bank of the Rhine, and in its sweep northward, between that river

and the Black Forest, has the Boden See for its southern extremity and the Main for its northern extremity. The general face of the country has a uniform descent from E. to W. towards the Rhine, into which there is scarcely a river in the Baden territory which does not discharge its waters. The soil is generally productive, but more particularly in the valley of the Rhine and the land adjacent to the Neckar. Even the sandy region about the capital (Carlsruhe) has been worked into fertility by persevering cultivation; and there are few tracts, in the more elevated districts, where the luxuriant growth of timber is impeded by climate or positive barrenness. Of the productive land rather more than one-third is arable, and about an equal quantity woods and forests.

Of the mountain forests the most remarkable is the Schwarzwald or Black Forest, which runs parallel to the Rhine from S.S.W. to N.N.E. It forms a connected chain rather than a series of isolated groups, and in its course from the vale of the Wutach towards the left bank of the Neckar, throws out its arms into the neighbouring districts, where its wild and wooded heights subside into slopes covered with vineyards and orchards, increasing in proportion as they approach the Rhine. Its length is about 83 miles, it contains much mineral wealth, and its surface is clothed with fine timber trees; it has three summits about 4000 feet high, and it gives rise to many rivers. Immediately opposite to the Black Forest, but on the northern or right bank of the Neckar, rises the Odenwald, a range of inferior elevation, which is sometimes considered as a prolongation of the Black Forest. It spreads through that portion of Baden which lies north of the Neckar, and takes a north-easterly bend towards the Tauber and Main; in the west it has an abrupt descent to the valley of the Rhine. It is densely covered with forest trees, and its valleys are fertile and populous. The Kaiserstuhl or Emperor's Seat, a volcanic mass, nearly 10 miles in length and 5 miles in breadth, which lies between the Rhine and Treisau, and is wholly isolated from the Black Forest, may be looked upon as altogether an independent group.

Baden contains three springs, which are the source of the second in rank of European rivers. These are the Brigach, the Breg, and a smaller stream, which, when they meet at Donaueschingen, form the Danube. This river flows for a few miles through the southern part of Baden, before entering Württemberg and Bavaria. The Rhine enters Baden west of Stein, in the canton of Schaffhausen, and forms its southern boundary, excepting where that boundary is twice, though but for a short distance, broken by the intervention of that canton; and after it has quitted the territory of Basle, where it turns to the north, it skirts the western districts of Baden until it enters the grand-duchy of Hesse immediately north of Mannheim. Its fall, between that town and the point where it issues from the Boden See, is 916 feet; between Schaffhausen and Basle its breadth widens from about 340 to 750 feet, and at Mannheim it is 1200 feet in width. Numerous islands stud the river, and its waters abound with fish. The principal tributaries of the Rhine on the Baden side, and the places of junction, are—the Neckar, which joins it at Mannheim; the Main, at Mayence; the Kinzig, at Kehl; the Murg, at Steinmauern; the Wutach, at Thiengen; and the Elz, at Niederhausen.

Two projecting portions of the Lake of Constance are considered to be in Baden. Their waters are full of fish, but of no great importance in a commercial point of view, though they facilitate the intercourse between the districts around them. Among the other lakes in the grand-duchy are the Mockinger See, the Illmen See, the Schlittsch See, the Feld See, the Eichner See, and the Nonnmattweiher See—all of minor importance.

The climate throughout the levels and valleys, which

are bounded by the Rhine, and lie deep embosomed by the mountains, is mild and conducive to health; but in the elevated regions of the Black Forest and Odenwald it is exceedingly raw and inclement. Here, indeed, where spring, summer, and autumn are crowded into the space of three months, the transition from the winter to the open season is so abrupt that it is not uncommon to pass from frost and snow at once into the heat of summer, and from this into the depth of winter. The exposed parts of the Black Forest can scarcely be brought to produce oats or potatoes, nor does the cherry ripen before the month of September. Yet the atmosphere of Baden is everywhere characterized by salubrity—a fact which is proved by the vigour of frame and longevity to which its inhabitants attain.

Natural Productions.—Baden possesses a soil favourable to the growth of grain, wine, and fruit, and is full of noble forests and navigable streams. Agriculture is the chief occupation of its inhabitants, and yields a surplus of produce. Only 6 acres in a thousand are waste land. The upper and lower districts produce rapeseed, hemp, flax, and opium; and the lower districts in particular which include the former Palatinate of the Rhine, where the best husbandry prevails, considerable quantities of tobacco and hops. Potatoes and fruits are largely grown; and cider, perry, and wine are made in considerable quantities. The timber trees of the grand-duchy consist principally of the fir, pine, oak, beech, birch, alder, aspen, and ash. The trees are floated down the Rhine in immense rafts.

Horned cattle are bred chiefly in the Breisgau, the Baar (about Donaueschingen, Firstenberg, Blumberg, &c.), and the parts adjacent to Lake Constance. The breeding of sheep has much increased of late years, and the quality has improved by crossing with the merino breed. Goats and swine are largely reared; horses are comparatively few. In several quarters honey and wax are obtained, and in all poultry and domestic animals are found in abundance. The wild boar, stag, roe, fallow-deer, fox, badger, marten, and otter, the vulture, eagle, falcon, hawk, kite, and owl are the principal wild animals. Most of the lakes and rivers, the Neckar being a peculiar exception, are rich in fish; trout of very large size are caught in Lake Constance, and carp in the Rhine.

Among the mineral productions we may enumerate the garnet, crystal, jasper, chalcodony, and onyx; marble, alabaster, gypsum, chalk, porcelain earth, and potter's clay. Silver, copper, and lead are found along the valley of the Kinzig and Münster, and in the neighbourhood of Kork and Pforzheim. Iron ore is obtained from the mines at Stockach, Kandern, the Black Forest, Hanenstein, &c. Inconsiderable quantities of cobalt, manganese, zinc, sulphur, coals, alum, vitriol, and bismuth are likewise raised. Salt is procured in great abundance in the Black Forest.

Baden—as the name implies—is rich in mineral waters; the warm springs of Baden-Baden, impregnated with sulphur, salt, and alum, have acquired great celebrity; a spring of nearly the same quality exists in Baden-Weiler; acidulous waters are found at Griesbach, Antogast, Petersthal, and Rippoltsau; and sulphur springs and baths at Salzbach, Langenbrücken, and other places.

Religion and Education.—The inhabitants, with the exception of about 26,000 Jews, are of pure German extraction—two-thirds of the whole number being Roman Catholics. For the purposes of ecclesiastical government, the country is divided into sixty-four Catholic and thirty Protestant deaneries. The head of the Catholic Church of Baden is the Archbishop of Freiburg. The few nunneries which are allowed to exist are subject to rigid regulation, and their attention is principally directed to female education. The management of the Lutheran Church is under a council of seven persons, who are nominated by the

grand duke; but a new constitution for the Protestant Church, prepared in 1861, secured all but complete self-government to the various congregations of Protestants. Every individual, whatever his creed may be, possesses equal civil rights.

In no German principality have state and church been so directly in conflict; for Baden led the van in constitutional reforms under the influence of a Protestant sovereign, who was foremost in promoting popular education on a sound basis. School attendance is compulsory from six to fourteen years of age; and every parish is bound to have at least one school under the management of a school board elected by the ratepayers, and under the inspection of functionaries appointed by the state. The instruction given in the elementary schools is very efficient, and nowhere in Germany is popular education higher than in the duchy of Baden. Penalties may be enforced for neglect; but they are apparently little needed, great regard being paid to the moral obligation to send the children regularly to school. The employment of children under eleven years of age in factories is prohibited. There are numerous institutions of a superior class for the religious communities; particularly the two universities, of which that of Heidelberg, founded in 1386, is more particularly designed for Protestants, and that of Freiburg, founded in 1160, for Catholics. The former has about sixty professors and 950 students; and the latter, 220 students. The scientific and artistic institutions are numerous; and the polytechnic school at Karlsruhe is among the most efficient institutions of the kind in Germany.

Manufactures and Trade.—The manufacturing industry of the grand-duchy, which did not formerly rank very high, has of late years exhibited increasing activity. Ellingen, Pforzheim, Karlsruhe, and Mannheim are the chief places of industry. Fire-arms, iron wire, copper-ware, nails, vitriol, saltpetre, linens, woollens, cottons, silks, clocks, watches, jewellery, wooden-ware, and toys, paper, tobacco, potash, white lead, glass, and earthen-ware are manufactured in various parts. Beet-root sugar is manufactured more largely at Waghäusel than anywhere else in Germany.

The position of the country on the Rhine, Main, Neckar, and other streams, and the access which they give to Switzerland, France, and Germany, have rendered Baden a country of extensive transit, and secured to it outlets for its own productions. The institution of free ports at Mannheim, Schräck on the Rhine above Karlsruhe, Ottenheim and Freistett on the same river, Ludwigshafen and Constanx on the Lake of Constanx, and Heidelberg on the Neckar, was dictated by sound policy. The imports of Baden consist of colonial produce, drugs and dyes, iron, steel, cottons, silks, fine woollens, horses, cattle, &c.; and its exports of timber, grain, meal, skins and hides, wine, hemp, linen, tobacco, iron-ware, jewellery, fish, &c.

Government.—The executive and judicial powers in Baden are vested in the grand-duke, and the legislative are shared by him with an upper and a lower chamber of representatives. The Upper Chamber comprises the princes of the reigning line who are of age; ten nobles; the proprietors of hereditary landed estates worth 500,000 mark, or £25,000; the Roman Catholic archbishop; the superintendent of the Protestant Church; two deputies of universities; and eight members nominated by the grand-duke, without regard to rank or birth. The Lower House consists of sixty-three representatives of districts and towns, chosen for eight years, and elected by all the male inhabitants. To be a deputy it is necessary to possess tax-paying property to the amount of 16,000 mark, or £800; or to hold a public office with a salary of not less than 2500 mark, or £125 a year. The elections are indirect; the citizens nominating the *Wahlmänner*, or deputy electors, and the latter the representatives. The four circles of the duchy has each its own provincial

government, and the circles themselves are subdivided into districts, each having its local functionaries, to whom are referred all affairs connected with the regular administration of justice, police, &c.

The revenue is about 40,000,000 mark, or £2,000,000, annually, and the expenditure generally somewhat in excess. The public debt is about £12,000,000. Nearly all the railways of Baden are the property of the state, giving a dividend, on the capital expended, of about 6 per cent.

History.—The house of Baden is one of the oldest families in Germany, and is clearly traceable to Berthold, count of Breisgau, in the eleventh century. His grandson, Hermann II., was the first margrave of Baden. Their descendants gradually acquired considerable possessions in Swabia, Switzerland, and Burgundy, but they were from time to time much reduced by partitions among collateral branches, until Ernest, the second son of Christopher II., became founder of the line of Baden-Durlach in 1527, which acquired considerable celebrity from George Frederick, his son. The line of Baden-Baden becoming extinct in 1771, their scattered dominions, which lay between the Swiss frontier, the Rhine, and the Neckar, were united under one head, though even so late as the year 1801 they did not occupy a larger area than 1617 square miles, nor contain more than 210,000 inhabitants. By the treaty of Lunéville, Baden acquired an accession of 1260 square miles of territory and 245,000 inhabitants, and a further and much more considerable accession under the treaty of Presburg in 1805. Two years before this treaty Charles Frederick, in whose person the two houses were united in 1771, exchanged the rank of margrave for that of an elector of the empire, in which character he forwarded Napoleon's views by joining the confederation of the Rhine. In 1806 he married Stephanie, the adopted daughter of Napoleon, and again exchanged his title for the dignity of grand-duke. The earldom of Hohen Geroldseck was united to Baden in 1819. It contained 52 square miles and 4600 inhabitants.

Charles Frederick died in 1811, and was succeeded by his grandson Charles Louis Frederick, who died in 1818. He was succeeded by his uncle Louis, who died in 1830, and was succeeded by his step-brother Leopold. His son and successor, Louis, was removed from the throne on account of mental incapacity, and was succeeded by the present duke, Frederick L, in 1852. He assumed, by patent, the title of grand-duke of Baden on the 5th of September, 1856.

Baden took no important part in the war between Austria and Prussia in 1866; but as a result of that struggle it was joined with Bavaria, Würtemberg, and Darmstadt, and formed into the South German Confederation. The war between France and Germany in 1870-71 having resulted in obliterating all differences between North and South Germany, Baden now forms part of the Germanic empire.

BADEN (also called *Baden-Baden* to distinguish it from other places of the same name). This town, the *Civitas Aurelia Aquensis* of the Romans, is in the centre of the grand-duchy of Baden, 6 miles from the Rhine, and 18 S.W. of Karlsruhe, and is connected by a short branch with the Mannheim and Basle Railway. It is invested with peculiar attraction, owing to its warm springs and its romantic situation on the banks of the Oos, embosomed among the hills of the Black Forest. The town is chiefly built on the slope of a hill (which is crowned by the residence of the former margraves), owing to the narrowness of the valley. It is in some parts irregular and old-fashioned, but many handsome and modern residences have been built of late years. It is one of the most fashionable watering-places in Europe, and in Germany is rivalled by Wiesbaden only. The waters are especially

recommended in chronic cutaneous diseases, gout, rheumatism, &c. There are more than twenty springs impregnated with salt, alum, and sulphur, which flow down from the hill on which the castle stands. The temperature of these springs varies, according to Stein, from 115° to 153° Fahr. The vapour arising from the hottest springs is collected and used by invalids in the mode of vapour baths. The principal bath-house is the Friedrichsbad, an imposing edifice erected 1869-77, and rising in terraces close to the springs. The exterior is executed in red and white sandstone, and embellished with statues, busts, and medallions. In the completeness and elegance of its internal arrangements it is probably unrivalled by any other building of the kind in the world. The Trinkhalle—where the waters are drunk—is most frequented from seven to eight in the morning. Near it is the Conversationshaus, which contains large and handsome ball, concert, reading, and other rooms. There are chalybeate springs also in the neighbourhood, which is as remarkable for the salubrity of its climate and the luxuriance of its vegetation, as for the varied and picturesque scenery in which it abounds. The church, built on the site of some Roman ruins in the seventeenth century, contains the burying-place of the margraves, and handsome monuments in memory of two of them, Lewis and Leopold-William. There are also an English church and a Greek chapel. There are several first-class hotels with butlis, and an hospital. The well-known gambling saloons of Baden-Baden were closed in 1872. The resident population in 1881 was 11,000. In addition to this population, the number of visitors in the bathing season, from May to October, amounts to about 40,000. Even in winter a large number of strangers now reside at Baden.

BA'DEN, a town in Lower Austria, situated about 15 miles S. of Vienna, on the railway to Gratz. It was the *Thermæ Cætie*, or *Austriacæ*, of the Romans. It is much frequented on account of its hot springs and baths. The resident population of the town is about 6500; but in the bathing season the number is increased by visitors, chiefly from Vienna, to as many as 15,000. The waters are sulphurous, and flow from eleven springs into fifteen reservoirs at the rate of 80,640 cubic feet every twenty-four hours. The temperature of the hottest spring is 99°, and of the coolest 86° Fahr. Suitable dresses are provided; and the baths are used by both sexes in common, and are called "society" baths. The town contains a fine Gothic church, and a large number of handsome villas. It is most picturesquely situated at the mouth of the romantic Helenenthal, near the banks of the Schwechat. In the environs stands the magnificent palace of Weilburg, belonging to members of the imperial family; the extensive grounds are most tastefully laid out, and are freely open to all visitors.

BA'DEN, a town of Switzerland, in the canton of Aargau, on the left bank of the Limmat, 14 miles N.W. of Zurich. It is celebrated for its hot baths, known to the Romans by the name of *Thermæ Helveticæ*; they are at a short distance from the town, on both sides the river; the water in the hottest has a temperature of 126° Fahr. They are much frequented by the inhabitants of Basel and Zurich. The resident population is about 3500, and about 15,000 visitors usually arrive for bathing. The environs of the town are very beautiful; and a number of fine cottages for the use of strangers are scattered over the neighbouring heights. The deputies of the Swiss cantons have often held their diets at Baden. The treaty between France and the empire in 1714, which put an end to the war of the Spanish succession, was signed here.

BAD'ENOCH, a mountainous district of Scotland, in the south-east of the county of Inverness. It derives its name from a word which signifies *bushy*, having been originally covered with natural forests, of which some of

considerable extent still remain. Badenoch was in early times a lordship of the Comyns, who were for many centuries one of the most powerful families of Scotland, and who contested the crown of Scotland with the Bruces. The district of Badenoch is very thinly populated.

BAD'GER is a genus of *CARNIVORA* belonging to the same family as the OTTER, POLECAT, and SKUNK. Like the bear the badger is *plantigrade*, that is, it walks with the whole of the foot on the ground. The common badger



The European Badger (*Meles meles*).

(*Meles meles*) is extensively spread through the northern parts of Europe and Asia. It is nocturnal and reclusive, frequenting dense woods and forests, where it makes a deep burrow—a single gallery leading to several chambers, of which one, the last, is comfortably lined with dried grass and other herbage. Here it spends the day in repose, till approaching darkness invites it to wander abroad in quest of food. It is said to attack the nests of wild bees, plundering the store of honey, and devouring the larvæ without dread of the stings of the enraged insects, which cannot penetrate its thick rough hide. Quiet and inoffensive in its habits, the badger is at the same time bold and resolute, and defends itself with great resolution; it bites keenly, and maintains its grip with extraordinary tenacity; for not only are the muscles of the jaws extremely powerful, but the articulating condyle of the lower jaw is locked firmly into the receiving cavity of the skull. The general strength of the animal, moreover, is very great; and the skin, which is loose and tough, is well protected by coarse deep hair. From its prowess and bodily qualifications, the badger was formerly in request for the brutal sport of baiting, in which the courage of the dogs was put to a severe test. In West Somerset, East Devon, and in some parts of Wales, the badger is occasionally hunted by night, the strong scent of the animal enabling the hounds to track it easily. When the badger hears his enemies approaching he makes off to the nearest burrow, but finds it securely barred against his entrance. At last he is driven into the open country, and after showing more agility than his short stumpy legs would seem to warrant, he is brought to bay, and is usually killed fighting courageously to the last. Secluded in her deep burrow, the female produces from three to five young in the spring. They are assiduously nursed by her for the first six or seven weeks, and then gradually learn to shift for themselves. Although the old badger, when made captive, never loses its indolence and distrust, yet the young, when taken early, become as familiar and playful as puppies, and are exceedingly attached to those who feed and notice them. The hide of the badger is not without value; when properly dressed, it makes the best pistol furniture. The hair is made into brushes used by painters and others. The hind quarters, when salted and smoked, make excellent hams. The badger measures about 2 feet 3 inches in the length of the head and body, that of the tail being upwards of 7 inches. The head is long and pointed, the

ears close, the body broad, stout, and low, and the general contour stout and heavy. The hair is full, coarse, and deep, its general colour above is brownish-gray, lighter on the sides and tail; the under parts are black, as are also the legs and feet. The head is white, with a black stripe extending from the shoulder over the ear and eye almost to the muzzle. From its colour this animal is in some parts called the Gray; its old Anglo-Saxon name is Broc, a word still retained in Scotland and the adjacent parts of England. Beneath the tail is placed a pouch containing a secretion, the odour of which forms a sexual attraction. Fossil remains have been found, proving that the badger inhabited this country in Quaternary times, associated with the cave bear and hyena, and contemporaneous with primeval man.

The American badger (*Meles labradorica*), a native of California and Texas, can scarcely be called the representative of our European species; for though a burrowing animal it is not a forest-haunting one, but a tenant of the sandy plains and prairies. This species is called *siffleur* by the Canadians.

The American badger resembles the European species in size, but its muzzle is hairy at the tip, and its fore limbs stouter than in the latter. Its prevailing colour is hoary gray in winter, yellowish-brown in summer; the under parts are generally yellowish-white, and a white stripe runs from the nose over the forehead to the neck. The hair becomes not only very long but woolly in winter. This badger is more carnivorous than the European species, preying upon marmots and other small animals.

The Indian badger (*Meles collaris*) is the bhalloosoor, or bear-pig, of the Hindus. In size it equals a full-grown badger, but stands higher on the legs; and its snout is elongated and truncated at the extremity, like that



Indian Badger.

of a hog; the ears are small, covered with hair, and surrounded by a circle of white. The muzzle is flesh-coloured and nearly naked; two black bands run on each side of the head and unite near the muzzle; the larger of these bands on each side passes round the eye, extending to the ear, and thence along the neck and shoulder to unite with the black colour prevailing on the fore limbs. The general colour of the body above is yellowish-white. The hair on the back is coarse, and tipped with black. The under surface is very thinly clothed, and the tail resembles that of a hog. The toes, five on each foot, are united together their whole length, and armed with large strong claws adapted for digging.

BADMINTON, the predecessor of LAWN TENNIS, is a game very similar to its successor, but played with a shuttlecock instead of a tennis ball.

The game arose at Badminton in Gloucestershire, one of the country seats of the Duke of Beaufort; and report runs that a guest who neither rode, shot, fished, nor danced was compelled by the general verdict of a large party assembled at the house to invent some new sport in which he and all could join. The result was "Indian Badminton." But why Indian? This again is curious, for the game not becoming popular in England, had meanwhile found much favour in India amongst the European

colony, and was formularized with complete rules, &c. It is still played in India as an indoor game, but even there lawn tennis is driving it out, as it has done in England.

In the indoor game a large room is required, and the various details of the game are arranged according to the space at command. In the open air the size of the ground should be, if possible, 40 feet by 18 feet. In the centre of the ground a net about 2 or 3 feet deep is stretched, at a height of 5 feet, between two posts 20 feet from each end of the ground and 12 feet apart; two lines are marked in chalk on the grass, parallel to the net and 7 feet from it, one on each side, called the service lines; and the remainder of the space on either side (which is 18 feet by 13 feet) is divided into a right and left court, each measuring 9 feet wide by 13 feet deep, the inner line (service line) being, as stated, 7 feet from the net. The game is played with shuttlecocks and shuttlecocks, the object being to keep the shuttlecock travelling backwards and forwards over the net without letting it fall. The net being only 12 feet long, while the united courts are 18 feet wide, and the player who starts being bound to serve from the right court on his own side into the court on his left across the net instead of into that opposite to himself, the shuttlecock flies slantwise. If he fails to get it into the proper court his hand is out; but if he succeeds, his adversary is bound to endeavour to return it. Then the shuttlecock is in play, and any player on either side may return it, the first one who allows it to fall scoring a point thereby to the side of his opponents, or being "hand out." If the server's side is in fault it is "hand out," and the opponent becomes server; if the opponent's side fails the server scores one, and starts the next hand by serving from the left court across to the opposite court on his right hand (his opponent's left court). The game is fifteen points. If it is "thirteen all" the side scoring that can put five points, or if "fourteen all" three points; and the game then appears to start afresh, the five or the three being played out as before.

BADRINATH, a peak of the main Himalayan range, in the Garhwal district, North-western Provinces, British India, reaching to a height of 22,901 feet above the sea. On one of its shoulders, at an elevation of 20,400 feet, and 56 miles north-east of Srinagar, stands a shrine of Vishnu, which also bears the name of Badrinath. The existing temple, more noteworthy for its religious importance than for any architectural pretensions, is said to have been erected more than 800 years ago by Sankara Swami, who brought up the figure of the deity, which is of black stone and 3 feet in height, from the bottom of the river after diving ten times. The temple consists of a conical building, surmounted by a small copper-covered cupola, terminating in a golden ball and spire. Several previous temples, according to tradition, were swept away by avalanches, and the present erection has been severely shattered by an earthquake. Below the shrine a sacred tank stands on the hillside, supplied from a thermal spring by means of a spout in the shape of a dragon's head. Pilgrims of both sexes bathe in the holy pool. The god is daily provided with a dinner, and his comfort is carefully insured in many other ways. The vessels on which he is served are of gold and silver, and a large staff of servants attend to his various wants. The chief priest, known as the *Rawal*, is always a Brahman of the Nimbure caste, from Kirat Malwar, in the Deccan (Dakshin). The priests officiate at Badrinath from May to October, and then bury the treasure and retire to Joshimath for the winter. Four other temples are dependent upon Badrinath. Besides the offerings of pilgrims the revenue of a large number of the villages in Kumaun and Garhwal is appropriated to the use of the temple. Immense numbers of pilgrims annually pay a visit to Badrinath, and in some years as many as 50,000 persons have been known to attend the great festival. (Hunter's "Imperial Gazetteer of India.")

BAEDA. See BEDE.

BAEL or **BHEL** is the fruit of *Agle marmelos*. See EGLE.

BAE'NA (the ancient *Castra Viniana*), a town of Spain, in the province of Cordova, 23 miles S.E. of Cordova, on the Marbella. The town is picturesquely situated on the slope of a hill, and in the environs are some very productive salt mines.

BAER, KARL ERNST VON, a distinguished Russian naturalist, was born in the province of Esthonia, on the 17th February, 1792. He studied medicine first at Dorpat between 1810 and 1814, and afterwards in Germany, where, while maintaining himself by his profession, he studied comparative anatomy under Döllinger of Warzburg, and also made the acquaintance of Nees Von Esenbeck, whose principles had considerable influence upon the direction of his mind. In 1817 he was invited by Burdach to Königsberg, and in 1819 was appointed professor of zoology at that place. In 1826 he undertook the direction of the Anatomical Museum in Burdach's place, and previously to this he had received permission to found a zoological museum there. In 1834 he left Königsberg for St. Petersburg, where he was appointed librarian to the Academy of Sciences, and soon became known throughout Europe as one of the most distinguished comparative anatomists and physiologists. At a very early period he commenced the study of the reproduction and development of animals, subjects which before his time were but very imperfectly understood. His first work on this branch of science, entitled, "*Epistola de Ovi Mammalium et Hominis Genesi*," was published at Leipzig in 1827, and this was followed by his "History of Animal Development," of which the first part was published in 1828, and the second in 1837. In 1835 he also published a work on the "Development of Fishes." These works, with numerous papers on similar subjects, published by Von Baer in different scientific periodicals, opened up a new field of investigation, which other naturalists, in Germany especially, soon entered upon with great zeal, and these researches have gradually led to a vast change in the principles upon which philosophical zoology is founded. In 1837, by order of the Emperor of Russia, he was furnished with the means for making a scientific expedition to the Arctic regions. He made some valuable investigations of the northern shores of Russia, the results of which were communicated at various times to the Academy of St. Petersburg, and published by that society. In 1856 he published a work on "The Russian Empire and the Neighbouring Countries of Asia." He died at Dorpat on the 28th November, 1876.

BÆ'TICA, one of the Roman divisions of Hispania (Spain), so called from its chief river, the Bætis, now the Guadalquivir.

According to the arrangements of Augustus, Bætica was bounded on the W. and N. by the Anas (Guadiana); on the S. by the Atlantic and Mediterranean; and on the E. by a line drawn from near Ciudad Real, near the Guadiana, through Jaen and Granada to Moxcar, on the coast of the Mediterranean. Consequently it comprised Seville, part of the Portuguese province of Alentejo, Spanish Extremadura S. of the Guadiana, the western part of La Mancha, Cordova, the west part of Jaen, and the chief part of Granada.

BAETIS. See MAY-FLY.

BAE'ZA (the ancient *Beitia*), a city of Spain, in the province of Jaen, situated in a fertile plain which is watered by the rivers Guadalquivir and Guadalimar. The town contains a cathedral, university, and many fine buildings, the remains of its former grandeur, when it was in the power of the Moors, from whom it was wrested by King San Fernando in 1228. The population of Baeza is 13,000. In the time of the Moors it was a flourishing city of 50,000 inhabitants, and the capital of a separat

kingdom. It was the scene of the defeat of Hasdrubal by Scipio the Elder, B.C. 209.

BAFFIN'S BAY is an extensive sea on the N.E. coast of America, between that continent and Greenland. It is comprised between 68° and 78° N. lat., 51° and 80° W. lon., and lies in a N.N.W. direction. It is about 780 miles long, with a mean breadth of about 280 miles, thus giving an area of more than double that of the Baltic. It was first explored by Baffin in 1616, but his accounts of its extent to the northward were always much doubted until corroborated by Captain Ross in 1818. It is connected by Lancaster Sound and Barrow's Strait with the Arctic Ocean. The part of the bay to the south is known as Davis' Strait, and the narrower channel to the north takes the name of Smith's Sound.

Its shores are generally high, with perpendicular cliffs rising sometimes to the height of 500 and 1000 feet above the sea, and backed by ranges of mountains always enveloped in snow. On the surface of the land above the cliffs is found a scanty appearance of vegetation, principally mosses and ground-berries. The cliffs are frequently rent into deep ravines, which become filled with snow and ice. As these increase it projects into the sea, till, detached by its own weight, it forms the nucleus of those immense icebergs which are met with in these seas. A peculiar feature is the prevalence along the coast of small, high, and sharp conical rocks. It is remarkable how void of large islands this tract of sea is, all those which border its shores, except Disco, where there is a Danish settlement, being very small, and the centre of the bay being entirely without them. The depth of water is very great. The shores are deeply indented with sounds and bays. The prevailing geological features of the coasts are granite and gneiss, abounding in garnets; there are also found porphyry, chaledony, quartz, felspar, jasper, and a wood coal. Bears, black foxes, and hares, walruses and seals, ptarmigans, terns, gulls, eider and other ducks, auks and petrels, are the principal animals. The bay abounds in black whales, which are very large, and a number of vessels are employed in this and the seal fishery. The sea is only navigable from the beginning of June to the end of September.

BAFFO or **PAPHO**, a small seaport on the western coast of Cyprus. It occupies the site of New Paphos, which Strabo (xiv. p. 683) speaks of as a considerable place, having fine temples and a good harbour. Under the Romans, New Paphos was the chief town of the western division of the island. It was destroyed by an earthquake in the reign of Augustus, but soon after rebuilt. St. Paul (Acts xiii.) came to Paphos, and there made a convert of the Roman governor, Sergius Paulus. Old Paphos, at the S.E., was the chief seat of the worship of Venus, and had a large number of splendid temples. It was believed to be the favourite residence of the goddess, and the point where she first landed when she rose from the sea.

BAGATELLE, a substitute for BILLIARDS, possibly of French origin, as its name is French for "a trifle." The boards vary very much, the ordinary length of one being about 7 feet; the larger the table the greater the opportunity for skill. The width is about a quarter of the length. The board is covered with cloth like a billiard table, and the game is similarly played with cues and ivory balls. The further end of the bagatelle board is round, and following the outline of this semicircular end eight holes are arranged in a circle, with a ninth in the centre, thus:—

There is a spot a little in front of the hole 1, and on this a black ball is placed; the player takes eight other

balls and plays each in succession from a second spot not far from the end where he stands. If he plays so violently that his ball returns across the crease (most bagatelle tables have a natural crease, as they are made to hinge in the middle for convenience of storing), then the ball is removed from the table.

The first stroke must be to knock the black ball off the spot, and the game is to place all the balls, including the black one, in holes, each placed ball scoring the number of the hole it falls into, and the black ball scoring double. The 9 is of course by far the most difficult. The holes are better reached by rebound from the cushion struck at a proper angle than by direct play. No ball can score until the black ball has been hit. The finest stroke is therefore to hit the black ball on the right, so that it goes into hole 8, while the striking ball rebounds into hole 7, thus scoring twenty-three.

In the cannon game only three balls are used—white, white with a spot, and red. The players take each a ball, one "white," one "spot." The first stroke is made anywhere on the inner side of the striking spot (a region of the board technically called "in baulk"), the red ball being on the spot in front of the hole 1, and the opponent's ball midway between holes 9 and 5. When the game has begun the players take it in turn, each one continuing until he fails to make a cannon, that is, to strike both the other balls in one stroke, the red one first. After each cannon the player starts afresh from "baulk," leaving the other balls as they happen to lie. The cannon itself scores two, and the holes count as in ordinary bagatelle, the red ball counting double. The highest score in one stroke is thirty-five—eighteen for the red ball in hole 9, fifteen for the white balls in holes 8 and 7, and two counted for the cannon. This is a very much more scientific game than the usual one, and distantly approaches billiards in interest.

BAGAUDÆ, INSURRECTION OF THE, a peasant revolt in Gaul against the Roman empire, in A.D. 287, of so formidable a character that the name Bagaudæ became synonymous with "rebel" for centuries. Maximian, under whose reign it occurred, was originally a peasant of Sirmium. "Ignorant of letters, careless of laws, the rusticity of his appearance and manners still betrayed in the most elevated fortune the meanness of his extraction. War was the only art which he professed" (Gibbon). Diocletian associated this savage soldier in the empire, which began from its immense size to reel under attacks on its distant boundaries; and hardly was Maximian declared joint emperor than he was summoned to Gaul by the famous insurrection which is the subject of this article. The word Bagaudæ is probably from the Celtic *bagad*, a tumultuous assembly, and was used to signify the poor peasantry of Gaul. These, like the villeins in England of the fourteenth century, had become reduced almost to servitude, compelled to perpetual labour on the estates of the Gallic nobles, whom originally they had implored to become their protectors, and who had abused the trust. They were almost confined to the soil by the customs and laws which gradually grew up; and during the long series of troubles in Gaul which, amongst other similar dangers in the outer limits of the civilized world, had occasioned the rise of Maximian to the purple, they experienced at once the tyranny of their immediate lords, of the barbarians who attacked them from the east and the north, of the Roman soldiers, and of the rapacious tax-farmers. "Their patience was at last provoked into despair. On every side they rose in multitudes, armed with rustic weapons, and with irresistible fury. The ploughman became a foot soldier, the shepherd mounted on horseback, the deserted villages and open towns were abandoned to the flames, and the ravages of the peasants equalled those of the fiercest barbarians" (Aur. Victor). They asserted the natural rights of men, but they asserted those rights with the most savage

cruelty. The Gallic nobles fled, and the peasants reigned without control; two of their chiefs, *Ælianus* and *Amandus*, assumed the imperial style, and medals coined by them still exist. Their power soon expired at the approach of Maximian's legions. The strength of union and discipline obtained an easy victory over a lawless and divided multitude (Eutropius, ix. 20). A severe retaliation was inflicted on the peasants found in arms; the cowed survivors returned to their wretched homes, and their unsuccessful effort for freedom served only to confirm their slavery. If we are to believe in "Life of S. Babolinus," of great antiquity, certainly not later than the seventh century, the two leaders of the Bagaudæ named above were Christians, and the fight was for religions as well as for political freedom; but the point rests on this one authority, and is unsupported by contemporary evidence.

BAGDAD or **BAGHDAD**, an important pashalic or government, forming the south-eastern part of the Turkish empire in Asia. The length from N.W. to S.E. is about 550 miles by 350 of extreme breadth, comprehending the principal part of the ancient Mesopotamia and Assyria, the whole of Babylonia and Chaldea, and a considerable portion of Susiana. It lies between 30° 40' and 37° 30' N. lat., and between 40° 10' and 46° 30' E. lon., and is bounded on the S.W. by the Arabian Desert, and on the N.E. by Persia. The part of Mesopotamia which is comprehended in the modern pashalic of Bagdad is now called *Aljezirah*, or the Island; Babylonia and Chaldea form *Irak Arabia*; Assyria partly corresponds to *Kurdistan*; and the present *Khusistan* was the ancient *Susiana*.

This extensive territory, estimated to have an area of over 100,000 square miles, is traversed by the Euphrates and Tigris, which ultimately unite, and enter the Persian Gulf in a single stream.

The country between the Euphrates and Tigris, from lat. 34° to Korna, is intersected by the dry beds of many natural and artificial canals. One or two of the latter in the vicinity of Bagdad might perhaps be made available for navigation without any enormous expense. The only canal now useful is called *El-Hye*, which connects the Euphrates and the Tigris exactly half-way between *Bus-sorah* and Bagdad, and is navigable in the spring for large boats. Other channels may be traced which extend in a direction parallel to the Tigris and Euphrates, and might have been originally intended not only to serve the purposes of irrigation, and to drain the marshes, but to avoid the delay and trouble which vessels have now to encounter in following the windings of the river.

In briefly describing the surface of the pashalic of Bagdad, we shall consider separately the part to the east of the Tigris, that to the west of the Euphrates, and that between the two rivers. Of these three portions that to the east of the Tigris is the most fertile, especially *Kurdistan*. The Kurds who live within the limits of the Turkish pashalic are not migratory. They are principally cultivators, and are generally governed by chiefs of their own choice. Their plains and valleys produce rice, wheat, barley, sesame, tobacco, gail-nuts, and all kinds of fruits, particularly grapes. The inhabitants of the other parts of the pashalic draw largely upon *Kurdistan* for their agricultural produce. *Khusistan*, also eastward of the Tigris, although having a fertile soil, is little better than a desert, for extensive wastes have been formed on sites once inhabited, and the sands of positive deserts have encroached upon its once fertile plains. The spots that still retain a productive soil are chiefly in the neighbourhood of the rivers, and either afford good pastures or repay the labour of cultivation.

The portion of the pashalic of Bagdad which lies to the west of the Euphrates may be dismissed very briefly. Beyond the immediate vicinity of the river the whole territory is a desert of the most positive character—sandy, flat,

without herbage, and without water. The banks of the river are, however, very fertile in many parts, and the annual overflowings of the river in its lower course form the most productive rice-grounds in the country.

That part of the pashalic which is comprehended between the Tigris and Euphrates is divided into Aljezirah and Irak Arabi. The former is that portion which extends from the northern limit of the pashalic to the point where the rivers approach each other near Bagdad. It is almost wholly a desert, producing but few plants. Irak Arabi, the more fertile of countries in the time of Herodotus, is now almost a complete desert.

Among the vegetable productions of the pashalic are the tamarisk shrub, the liquorice plant, the willow, the poplar, the castor-oil plant, the carob plant, the crowfoot, the caper, and many others. Grapes, figs, pomegranates, and quinces are largely grown; but the plants best known in England are not much cultivated. Among the birds of this region are black partridges, snipes, and wild pigeons; the lakes and marshes abound with wild geese and ducks, widgeons, and pelicans. The common fowl and pigeons are the only domestic birds. There are no turkeys, and geese and ducks are not domesticated. The wild animals are gazelles, lions, jackals, hogs, and hares. The lions are not numerous, and their haunts are chiefly among the sepulchral barrows of the Tigris. The jackals are more abundant and troublesome, and when they find an opportunity enter the towns and villages during the night. The domestic animals are horses, asses, mules, buffaloes, single-limbed camels, and dromedaries. The horse of the country is a most beautiful animal. As beef is not an article of food, oxen are not reared for slaughter, but they are much employed in agricultural labour.

It is not to be understood that the direct authority of the pasha of Bagdad extends over the whole of this territory of about 100,000 square miles. In the north the pasha of Mosul is appointed immediately by the sultan, and governs a small territory in some degree of independence, although he usually acts as if overawed by his great neighbour. In the north-east the Kurds take care that the yoke of Bagdad shall not lie heavy upon them. In the south, with the exception of the small districts around the few towns, the Arabs are the actual masters of all the country from Bagdad to the Persian Gulf, and from the mountains of Kurdistan to the frontier of Arabia proper. The sheikhs acknowledge a sort of dependence upon the pasha, with a sincerity proportioned to the strength of his government.

BAGDAD or BAGHDAD, a large city of Asiatic Turkey, formerly the capital of the great empire of the caliphs, and now of the pashalic of its own name. It stands on the banks of the Tigris, about 220 miles in a direct line above the junction of that river with the Euphrates, and 290 miles above the point where the united stream enters the Persian Gulf.

The external appearance of the city does not disappoint the expectations which may have been formed from eastern history and romance. It stands in a forest of date-trees, which conceals the meanness of its buildings from the approaching stranger, but allows such glimpses of its splendid minarets and domes as prevent him from suspecting that the ancient glory of Bagdad has entirely departed.

The city is divided into two parts by the Tigris, of which the western, once the chief, is now the subordinate half. The whole city is surrounded by a high and thick wall of brick and mud, which is about 5 miles in circumference; but a large portion of the area which it incloses is laid out in gardens and plantations of date-trees.

The interior of Bagdad miserably disappoints the expectations which the exterior view may have raised. It is built on no regular plan, and there are few towns even in Asia the streets of which are so narrow and tortuous. They are not paved; they are full of inequalities occasioned

by deposits of rubbish, and rendered disgusting by all kinds of filth, which would endanger the public health were not the most noxious part speedily removed by the numbers of unowned and half-savage dogs.

In general the houses do not, as in Western Turkey, present any windows to the street. Instead of a regular front with windows, there are high walls pierced by low and mean-looking doors; but in some of the better streets the Turkish kiosk, or large projecting window or else the Persian lattice, occasionally occur. Houses are mostly built of kiln-burned bricks, which, when new, are not much unlike those employed in London, either in shape or colour. The houses have two floors besides the habitable cellars. The ground floor is occupied with baths, store-rooms, and servants' offices. The first floor contains the state and family rooms. The great height of the apartments on this floor makes the house as high as one of two stories in this country. The splendid and often elegant appearance of these rooms presents a striking contrast to the filthy and beggarly aspect of the streets. The rooms have often vaulted ceilings, which are decorated with checkered work and mouldings in very good taste. They are amply provided with windows of coloured glass, and the walls are so profusely ornamented with gilding, painting, and inlaid mirrors, as to make a stronger impression on a stranger than a detailed examination will perhaps be found to confirm. The buildings of a house in Bagdad commonly occupy two or three sides of the interior of a square court. In this court, which is paved with square stones, some date-trees are usually planted; and there is frequently a fountain in the centre. Access to the first floor is afforded by external stairs of stone, which conduct to the verandah, into which all the doors of that floor open. This verandah, which is supported by the walls of the ground floor, is generally wide, and paved with squared stones, and its boarded covering and curved screen are supported by pillars of wood, the capitals of which are often very curious.

The only public buildings of note are the mosques, the khans or caravanserais, and the bazaars. There are said to be about 100 mosques in the town; but not more than thirty are distinguished, in a general view of the city, by domes and minarets. The domes are remarkable, not less for their unusual height than for being covered with glazed tiles of various colours, chiefly green, blue, black, and white, disposed with considerable taste. The minarets are also glazed, and in still better taste than the domes, the colour being of a light brown, with a different colour to mark the lines formed by the junction of the bricks. The bazaars are numerous and extensive, but are in appearance much inferior to those of some other Oriental cities of less note. The baths and khans, or caravanserais, are numerous, but inferior to those of many other Asiatic towns.

The communication between the two parts of the city divided by the Tigris is by means of a bridge of thirty pontoons, and also by means of large round baskets coated with bitumen.

The existing ancient remains in Bagdad are very few; but these few far exceed any of the modern structures in solidity and elegance. Three or four ancient mosques, a building which served as a college so far back as 1233, six gates in the wall, and the tomb of Zobeide, the favourite wife of Haroun al Raschid, and the heroine of one of the best known stories in the "Arabian Nights," originally built in 827, but frequently restored, are among the number.

The climate of Bagdad is salubrious, but intensely hot in summer. This heat is partly due to the prevalence, during part of the summer, of the hot wind, the *samiel*. This wind is popularly considered to prevail during forty days, but its actual duration is often twice as long, during which period it commonly rises about noon, or somewhat earlier, and continues until three or four o'clock in the afternoon. It is felt like a gentle breeze which has just passed

over the mouth of a lime-kiln. The city would at that season be scarcely habitable but for two compensating circumstances—one of these is the bracing coolness of the nights, to enjoy which the people sleep upon the flat roofs of their houses from the middle of May to the latter part of September; the other is provided by the people themselves, who have under their houses spacious vaulted cellars, in which persons whose circumstances or occupations allow it live almost entirely by day during the summer season. Snow never falls at Bagdad, and hail very seldom. The cold of winter is never intense, but the inhabitants often suffer from it; this arises from their rooms being exclusively constructed for summer use, and from the temperature of the same rooms being very little heightened by the braziers or earthen pans of charcoal which, in the absence of stoves and fire-places, are employed.

A drop of rain rarely falls at Bagdad later than the beginning of May, or earlier than towards the end of September. After the end of September the rains are copious for a time, but the winter is on the whole dry. The swollen state of the Tigris after the summer rains, and also after the melting of the snow on the distant mountains, frequently occasions great inundations.

The population of Bagdad, amounting altogether to about 150,000, is exceedingly mixed; and the very distinctive dresses of each people clearly indicate the component parts of the population. The Osmanli Turks, with their long loose gown and red cap; the Christians, with a somewhat similar costume; the Jews, with a yellow handkerchief tied round their red cap; the Arabs, with their sleeveless cloaks and shawl turbans; the Kurds, with their parti-coloured and fringed turbans; and the Persians, with their black conical caps and tight-fitting gowns, give a strangely picturesque variety.

The only women in Bagdad who exhibit any part of the face in the streets are the Arabs. Their dress consists in general of an exceedingly wide chemise of red or blue cotton, to which in winter is added one of the same cloaks that are worn by the men. They seldom wear shoes, and never stockings; but they are particular in their head-dress and personal ornaments. The Turkish and other women so muffle themselves up when they go out as to appear the most shapeless masses imaginable. Their faces are usually covered with hideous veils of black horse-hair.

Bagdad was formerly a great emporium of Eastern commerce. Besides the traffic with its own manufactures, it was the entrepôt for the commodities of eastern and western Asia. But political and commercial events have greatly reduced this commerce. Very large tracts of land, at no great distance from the city, now lie idle and neglected, which with comparatively little capital might be converted into a garden, the products of which would find a ready market in India and Europe. Since the opening of the Suez Canal there has been some return of commercial prosperity, and the more regular means of communication is inducing the opening up of the resources of the country. The manufactures are not very numerous or extensive. The red and yellow leathers are excellent, and are held in high estimation throughout Turkey. A few other manufactures in wool and silk are carried on.

Bagdad was founded by the Caliph Abu Jaafar al Mansur, in the year 763 A.D., and was much improved by Haroun al Raschid. It remained a most flourishing metropolitan city until the year 1259, when the town was taken by storm by Huleku, a grandson of Gengis Khan, and the dynasty of the caliphs was extinguished. Bagdad remained under the Tartars until the year 1393, between which time and 1470 it was alternately under different armies. In the year just named it was taken by Ussum Cassim, whose family reigned thirty-nine years in Bagdad, when Shah Ismael, the founder of the Sufide dynasty in Persia, made himself master of it. From that time to the present the town has been an object

of occasional contention between the Persians and the Turks. It was retaken by the Turkish sultan, Solyman the Magnificent, and it was regained by Shah Abbas the Great of Persia; but the Persians were ultimately obliged to surrender the place to the Sultan Murad IV., by whom it was besieged with an army of 300,000 men in the year 1638. It has since been subject to the Porte.

BAG'GAGE. By the marching regulations of the British army strict limitations are placed upon the amount of baggage allowed to officers and men, and similar rules are enforced with regard to the voyages of the troopships. A private soldier is not allowed to carry anything beyond what his knapsack and other accoutrements will hold. An exception is made with respect to those who have obtained their officers' permission to marry, a small chest being allowed them, but they are charged with the expense of its conveyance. Officers are of course entitled to a larger amount, varying according to their rank. On the troopships a field-officer is allowed 18 cwt., and the amount diminishes downwards to the 1 cwt. allowed for the requirements of a married private soldier with his wife and family.

BAG'GSEN, JENS, a writer of considerable distinction both in Danish and German literature, was born in Corsoer in the island of Zealand, on 15th February, 1764, and was educated at the University of Copenhagen. His first production, at the age of twenty, his "Comic Tales," obtained a favourable reception from the public. In 1789 he visited Pyrmont, and meeting there with his countryman the young Count Moltke, he accompanied him to Switzerland, and returned home through France and Germany. Of this journey he has given a full narrative, or rather picture, in his "Labyrinthien," one of the most interesting of his works, it being, as he himself calls it, his "Digtervandring," or "Wanderings of a Poet," in which he records his varied feelings, opinions, and contemplations, and portrays his own character. He died at Hamburg on 3rd October, 1826. His chief German poems, written during his long residence in France, obtained much celebrity at the time of their appearance. A complete edition, in twelve volumes, of his "Danske Værker" was published in 1832.

BAGHDAD. See BAGDAD.

BAGHERMI. See BEGHARMI.

BAGLI'VI, GEORGE, was born in 1668, but at what place is not ascertained. Having early manifested an inclination to the study of medicine, he began his studies at the University of Naples, and continued them at Padua, where he took his degree of Doctor of Medicine. His merits and acquirements having been made known to Pope Clement IX., he was, though yet very young, by him appointed professor of surgery and anatomy at the college of La Sapienza.

His opinion (contrary to that of the ancient Greek authority Hippocrates), that in the progress of diseases the fluids of the body are affected secondarily in consequence of a previous affection of the solids, has been gradually gaining ground since the time it was first promulgated. It received important additions from Hoffman in Germany and Cullen in England. It is now known that in some cases the fluids are primarily affected [see BACTERIA]; yet the opposite doctrine may be considered as the current hypothesis of the present day, and Baglivi the father of the modern system of *solidism*.

Baglivi died at Rome in 1706, at the early age of thirty-eight. Pinel published an edition of his works, with notes, corrections, and a preface (two vols. 8vo, 1788). Baglivi was a fellow of the Royal Society of London. His works have never been printed in this country, and copies of them are rare.

BAGNÈRES-DE-BIGORRE (the *Aquensis Vicus* of the Romans), a town of France, in the department of Hautes Pyrénées, is 481 miles S.S.W. of Paris, and 13

miles S.E. of Tarbes. It stands on the left bank of the Adour, and has a resident population of 9500. The town is celebrated for its medicinal baths, which are much frequented from June to the end of September, during which time the population is increased to about 15,000. The town is known as the French "métropole des eaux thermales," and the number of visitors during the season often amounts to 20,000. Bagnères stands at the foot of a limestone hill, from the sides of which the waters flow which supply the public and private baths. There are about seventy baths, which vary in temperature from 90° to 135° Fahr. The waters of all differ only in temperature; they are clear and without any peculiar taste, aperient, and tonic. They are very efficacious in debility of the digestive organs and other maladies. Bagnères is one of the neatest and best built towns in the south of France; the streets are wide, well laid out, well paved, and watered by streams from the Adour. The environs are very beautiful and extremely fertile; there are delightful walks in the valley of Campan, which abounds with handsome villas and beautiful gardens, and along the banks of the Adour. The town contains a library and reading rooms, and a handsome public bathing establishment. There are a high school and an hospital for the poor. Some manufactures of woollen stuffs of different kinds and of good qualities, serges, crapes, and other fabrics are carried on here; paper is also made. Quarries of fine marble are worked near the town.

BAGNÈRES-DE-LUCHON (Latin, *Aquæ Courenarum*) is a bathing town in the department of Haute Garonne in France, 495 miles S. of Paris, and 75 S.S.W. of Toulouse. Bagnères is at the junction of the fertile valleys of Luchon and Larboust. The environs of the town are pretty, and there are many beautiful promenades. Early in the present century a splendid bathing establishment was erected, and the town now attracts about 10,000 visitors annually, from the middle of June to the end of August. The resident population is about 4000. There are twelve springs; the waters, which are sulphurous, are arranged in three classes—the hot, the tepid, and the cold. The temperature varies from 88° to 180° Fahr. They are diuretic, and of great efficacy in cutaneous diseases, especially the ringworm. The valley of Luchon, near Bagnères, is wide and very fertile. The view of the summit of Maladetta on the Spanish territory, and the cascades formed by the mountain torrents, give great interest to the surrounding country. Lead, slate, marble, and pyrites are found near the town.

BAGNES, the name given to those convict prisons of France which in 1748 took the place of the galleys. They appear during the later period, at least, of their existence to have been well managed, and to have maintained excellent discipline. The labour of the convicts was used for the construction of arsenals and other public works; various handicrafts were taught by the overseers; and industry was encouraged by allowing the prisoners to retain a small portion of the wages earned by their labour. They were finally suppressed by the imperial government in 1852, the punishment of transportation to Guiana being substituted in their stead. Those in prison at the time of the change were allowed to elect either for a continuance of their imprisonment or for transportation.

BAGNI-DE-LUCCA (*Baths of Lucca*), a favourite bathing-place in Italy, in the province of Lucca, about 13 miles north of the city of Lucca. It is largely resorted to by English and other foreign visitors. The population is about 8000.

BAGNIO, a word formed from the Italian *bagno*, which means a bath, and also a bathing-house. It has been applied to the convict prisons in Mohammedan and French towns. [See BAGNÈS.] Bagno is sometimes synonymous with brothel.

BAGPIPE, a musical instrument which consists of a

leathern bag inflated by a port-vent fixed in it, which has a valve. It has three pipes, the first and second called the great and little drone, each giving but one note, and sounding the key-note and its fifth as a sort of rudimentary accompaniment all through the performance; the third, called the chanter, a kind of oboe having eight ventages or holes, on which the tune is played by the fingers. Sometimes it has three drones as well as the chanter. The wind is communicated to the pipes by compressing the bag under the arm, the mouthpiece of each pipe being fixed in the bag. The compass of this instrument is three octaves. A similar instrument was in use among the ancients under the names of *tibia utricularis* and *askaulos*. It is rather extraordinary, seeing that the latter name is purely Greek (from *askos*, a skin; and *aulos*, a pipe), that the instrument should be unnoticed by Greek writers. It was a favourite with the Romans; and one of Nero's vows, when the final danger threatened which cost him his empire and his life, was to join in the public bagpipe competition, should he escape.

The bagpipe was known to the English in the Anglo-Saxon period, and is frequently mentioned in mediæval times. Strutt records many payments to bagpipers in the reign of Edward III., both for performances and as travelling allowances, enabling them to journey abroad to study in the foreign schools. We know from Chaucer that it was the chief musical instrument used to lighten the tedium of the long Canterbury pilgrimage, where the miller "a bagpipe well couth blowe and sowne;" and many old English tunes bear evidences of having been written for the bagpipe.

Curiously enough it seems not to have been originally a national instrument in Scotland; for it only appears there, so far as there are any records on the subject, after its use began to decline in England. Many attempts have been made to show that Bruce's army at Bannockburn was cheered on by the bagpipe; but Froissart especially says that the noise "as if all the devils in hell had been let loose" (desired to be attributed to the bagpipes) was produced by the little horns which nearly every soldier carried. The bagpipe was undoubtedly used by the Scotch as a martial instrument as early as the battle of Bannockburn (1594). There is a pibroch called "Battle of Harlaw," which battle was fought in 1411, but the pibroch is unquestionably of later date. The old ballad's silence adds another proof; describing the fight of Harlaw, it says—

"The armies met, the trumpet sounds,
The dandring drums aloud did touk."

But there is nothing about the bagpipe.

The Irish bagpipe resembles more the clarinet, and is altogether softer in quality than the Scotch; it is much more generally blown by bellows than by the mouth. Shakespeare's "woollen bagpipe" ("Merchant of Venice," Act iv. sc. 1) refers to the Irish instrument, the native name for which is *uileann piobhe* (the elbow-pipe), whence the modern Irish name "union-pipe" is derived. Elsewhere he ridicules "the drone of a Lincolnshire bagpipe."

The German *sackpfeife*, the French *cornemuse*, the Italian *sampogna*, the Breton *bigoun* ("puffed-out") are all varieties of the old *utricularium*; and the Arabian *sougyarah* is the name of an Eastern form. Travellers find it in India, China, Persia, and Egypt. The "dulcimer" of the band of Nebuchadnezzar in our version of Daniel (iii. 5, &c.) is in Hebrew *sumphoniah*, and all scholars of importance are agreed this too should be rendered "bagpipe." The modern Italian *sampogna*, and the common mediæval name for the instrument, *symphony*, are relics of the ancient appellation.

At one time, during the middle ages, the bagpipe was universal in Europe, but with advancing taste its use has diminished, and it is now only found to any national extent in Scotland, in Italy, and (far less) in Poland. The scale of the Italian (Calabrian), Irish, and Northumbrian bellows-

blown bagpipes is our major scale; that usual in Scotland is very nearly our minor scale, with a minor seventh, which is indeed the most ancient of European scales, the ancient "diatonic" of the Greeks. [See GREEK MUSICAL SYSTEM.] It is not, however, to be brought accurately to any known scale, and any attempt to tune it perfectly is found quite to destroy its archaic and barbarous character, which exercises a complete fascination over those who have learned to love it, and which is quite unlike that of any other instrument. Ullman Ross, piper to Queen Victoria, published a large collection (of 243 pieces) for the bagpipe in 1869; but this was only a selection from over 1000 pieces he then possessed, collected from many of the old pipers and other genuine sources.

BAGRATION, PETER, PRINCE, a distinguished Russian general, descended from the noble family of the Bagratides of Georgia and Armenia, was born in 1765. He entered the service of Russia in 1782, with the rank of sergeant, and subsequently took part in the war against the tribes of Caucasus and of Kuban, who had submitted to Russian dominion. In 1788 he had attained the rank of colonel, and in that capacity assisted in the siege of Oczakow. He served in the wars of Italy and Switzerland under General Suwaroff, by whom he was held in high estimation. On the 10th April, 1799, he rendered himself master of Brescia, and took 1800 prisoners. After having signalized himself in various engagements he returned to Russia, where both he and Suwaroff fell into disgrace with the Emperor Paul I.; but under the successor to that prince, Alexander I., he was reinstated in his rank, and again distinguished himself in the Austro-Russian war of 1805 against the French. On the 16th of November of that year he remained at the head of a small body of troops opposed to superior forces under Murat and Lannes, and though half of them fell in the conflict they maintained their ground for six hours, while the Russian general, Kutusoff, secured his retreat to Znaim. Raised to the rank of lieutenant-general, he commanded the advance guard at Austerlitz under the Prince of Lichtenstein, and in the battles of Eylau and Friedland fully sustained his high reputation. In 1808 he commanded in Finland, where he defeated Doebeln and Lavenheim, and in 1809 commanded the Moldavian army in the campaign against the Turks. In 1812 he was defeated by Davoust at Mohilev, but he effected a masterly retreat, and succeeded in forming a junction with the west army at Smolensk. He was mortally wounded in the battle of Mosaik, on the retreat to Moscow after Borodino, and died 7th October, 1812.

BAGSHOT BEDS, in geology, take their name from Bagshot Heath in Surrey. They are marine beds, forming, according to Lyell, the middle portion of the Eocene formation.

The Lower Bagshot Beds which overlie the LONDON CLAY consist of light-coloured sands, unfossiliferous on Bagshot Heath; but the beds of pipe-clay which are interstratified at Bournemouth and Alum Bay contain impressions of leaves. These fossil leaves have been determined by MM. de la Harpe and Gaudin to belong to the fig tribe, the cinnamon, and other Laurineæ, the pea family, and the Proteaceæ, so abundant at the present day in Australia. The flora was luxuriant and varied, and resembles that of subtropical India and Australia.

The Bracklesham Beds are next above the Lower Bagshots, and are named from the place where they occur in Sussex. Beds of the same period occur in Alum Bay and Whitecliff Bay, in the Isle of Wight. The fossils point to a warm climate, and were apparently deposited in the estuary of a large river. Judging from alternations of sand and clay, it appears that the depth varied from time to time. Among the fossils are remains of a serpent (*Talophis typhenus*), which, according to Professor Owen, lived in the sea, was over 20 feet long, and was allied to the boa and python.

Crocodiles, sharks, volutes, cowries, and corals all favour the idea that a subtropical climate prevailed. The large mollusc *Cerithium giganteum*, and the foraminifer *Nemulites lavigata*, which are found in these beds, serve to show that they are of the same age as the "Calcaire Grossier" of Paris.

The geological survey includes in the Bagshot Beds the Barton Clay and Upper Bagshot Sands, but these are placed by Lyell in the Upper Eocene as the BARTON SERIES.

BAHA'MAS or LUCAY'OS are a chain of low islands stretching in a north-westerly direction from the north side of St. Domingo to the coast of East Florida, and lying between 20° and 27° 40' N. lat., 68° 40' and 79° 20' W. lon. The chain incloses and almost encircles the Gulf of Mexico, stretching altogether more than 600 miles. Its average width is over 100 miles. It is composed of innumerable rocks, islets (called keys), and islands, of which not more than ten or twelve are inhabited; these are New Providence, Eleuthera, Exuma, Harbour Island, Crooked Island, Long Island, San Salvador, Watling's Island, Rum Key, and Henegua. One of the largest islands, originally named Lucayo, but now called Abaco, with many smaller ones, still remain without inhabitants. San Salvador, called by the Indians Guanahani, had long been generally held to have been the first land fallen in with by Columbus on his first voyage in 1492. More searching inquiries, however, point to Watling Island, lying further east, as having the best claim to the honour of that event.

The Bahamas remained unsettled till 1629, when New Providence was taken by the English, who were expelled by the Spaniards in 1641. The English again took possession of the island in 1666, and held it till 1703, when a French and Spanish force again dispossessed them. In 1718 a new English colony was laid out, and Nassau, the capital of New Providence, was fortified in 1746. The Bahamas now enjoyed tranquillity till the American War, when New Providence was taken by the Americans (1776), but they abandoned it very shortly afterwards. In 1781 all the Bahamas were reduced by the Spaniards, but, by the treaty of peace in 1783, they were again restored to the British crown. At the close of the American War many of the Royalists transferred the remains of their property to these islands, and since that period the number of the people and the cultivation of the land have progressively increased. To encourage commerce, Nassau was declared a free port in 1787. This town is the centre of trade, but there are three other regular ports of entry—Exuma, Caycos, and Turk's Island. Nassau is also the seat of the government, which is similar to that of most other British West India islands; there is a governor and an executive and legislative council, and a representative assembly. The House of Assembly consists of the representatives of the several islands, thirty-one in number. The population in 1881 was 43,521.

The principal islands are situated on those remarkable flats called the Bahama Banks, of which the Great Bank (lying at the western extremity of the archipelago) occupies an extent of 300 miles in length and 80 in breadth. The deepest water on any part of this bank is 80 feet, but the patches of coral rock and dry sand are innumerable. These banks rise almost perpendicularly from an unfathomable depth of water, and are formed of coral, with an accumulation of shells and calcareous sand. The climate is temperate and healthy; the summer range of the thermometer is from 80° to 90° Fahr., and in winter from 60° to 65°. Nothing can be more genial than the climate from November to May; and Nassau, the capital, is now much frequented as a health resort by invalids from the United States. The north-east trade wind prevails throughout the year, with the exception of the winter months, when strong gales frequently blow from the north-west. Hurricanes are violent

and frequent, and earthquakes are sometimes felt. The Caicos and Turk's Island also belong geographically to the Bahamas, but they are attached politically to the government of Jamaica.

The soil being light and strong, little verdure clothes the Bahamas, but the group produces very fine fruit, amongst which may be mentioned oranges, citrons, limes, bananas, tamarinds, olives, pine-apples, pomegranates, figs, and melons; whilst potatoes, yams, cucumbers, pepper, coffee, sugar-cane, Indian corn, and peas abundantly supply the wants of the inhabitants. Cotton is indigenous to these islands, and at one time formed a valuable article of commerce, but its cultivation is now discontinued. On only one single island (Andros) is running water to be found; in all the others the inhabitants are entirely dependent upon wells, and upon the rain-water collected from the roofs of the houses, for their supply. The seas around the islands literally teem with fish, the capture of which is attended with little trouble, and many of the inhabitants follow the calling of fishermen. Agriculture, however, affords occupation for most of the inhabitants of the largest islands, whilst the collection of sponges and the raking of salt finds employment for others. Cattle, introduced from Europe, thrive in the Bahamas, but the rearing of stock has never claimed much attention, the islanders supplying themselves with beef and mutton from the United States, Canada, and Cuba. Of indigenous animals it may be said that there are none, but the feathered tribes are well represented, many of their members possessing plumage of extreme brilliancy, as the flamingo, several species of humming-bird, &c.

New Providence owes its importance as the seat of government entirely to the fact of its possessing a harbour, in which a few vessels of 15 feet draught may find a safe anchorage. The island is oval-shaped, $16\frac{1}{2}$ miles long, east and west, and $6\frac{1}{2}$ miles at its broadest part. A narrow ridge of wooded hills, from 80 to 120 feet high, skirts the northern shore almost the whole way, and on the northern slope of the ridge, about $5\frac{1}{2}$ miles from the east end of the island, stands the picturesque and well-built little town of Nassau, which possesses facilities for repairing damaged vessels, and can supply them with provisions and other necessities in abundance. The velocity of the Gulf Stream is at its maximum between the Bahamas and the Florida shore, running at the rate of 5 to 6 miles an hour.

The imports are valued at about £200,000 per annum, and the exports at about £140,000. The annual expenditure amounts to over £40,000. There is a public debt of £60,000. Formerly a large portion of the inhabitants derived considerable profit from giving assistance to vessels involved in the innumerable rocks and shoals, or by saving lives and property from wrecked vessels, whence they obtained the name of "wreckers." They were licensed by the government, and a legal salvage was allowed on all property recovered by them. For a number of years wrecks thus constituted the chief support of both the people and the government. But from the use of steam, the erection of excellent lighthouses, the increased intelligence of master mariners, wrecks are now comparatively of rare occurrence.

BAHAR. See **BEJAR.**

BAHAWULPUR, a native state in political relation with the government of the Punjab, and situated between that province and Scinde. This territory was until 1811 tributary to the Afghan government, which, however, did not in any way interfere with the proceedings of the immediate ruler of the division, Bahawal Khan. At his death, in 1811, the Rajah of Lahore seized upon a considerable portion of the territory. It was placed under the protection of the British in 1838. The state is bounded W. by the rivers Indus and Sutlej, and E. by the states of Jessulmeer and Bikaner. Its southern limit is about $27^{\circ} 42'$ N. lat., and its northern limit extends to $30^{\circ} 22'$ N. lat. The

largest portion of it is included in the Thurr or Indian Desert, but the soil on the banks of the rivers is generally fertile. The population in 1881 was 600,000, of whom 400,000 were Mohammedans. The principal articles of production in the state are silk, indigo, cotton, and cereals. Considerable extension has been made in the area irrigated by state canals, and the productiveness of the country has thus been very much increased. The Indus Valley State Railway runs through a large portion of the state, and crosses the Sutlej by a magnificent bridge at the town of Bahawalpur.

BAHAWULPUR, the capital, stands near the river Sutlej, in $29^{\circ} 22'$ N. lat., and $71^{\circ} 42'$ E. lon., 62 miles S. from Multan. Including its gardens the town is 4 miles in circumference. The houses are built of unburned bricks. The merchants of Bahawalpur are Hindus; they have much commercial enterprise, and deal extensively in goods of European manufacture. The town has long been famous for its loongees, scarfs, turbans, chintzes, and other cottons. It has also a good trade in fruit and provisions. Population, 20,000.

BAHIA, a province of Brazil, between 9° and 16° S. lat., and 36° and 43° W. lon. On the E. it is washed by the Atlantic Ocean, on the W. and in part on the N. it is divided from the province of Pernambuco by the Rio San Francisco, and on the S. it is bounded by the provinces of Espirito Santo and Minas Geraes. The total area is 201,794 square miles, and the population is about 1,450,000.

By far the greatest part of the surface is covered with mountains; plains only occur along the coast and on the banks of the Rio San Francisco.

Bahia may, with respect to its climate and productions, be divided into three districts—the Beira-Mar or southern coast country, the Reconeave or northern coast country, and the mountain region. The Beira-Mar enjoys many advantages. It has abundance of running water, and generally a fertile soil, in which mandioca, rice, Indian corn, the coffee tree, the sugar-cane, and the cotton-plant prosper. But, on the other hand, heavy dews and almost incessant rain render it an unpleasant and unhealthy country. There is scarcely a distinction of seasons; the trees bear blossoms and fruits in all stages at the same time. The temperature of the winter is never cold enough to check vegetation, nor is the summer hot enough to call forth its full force, because the sky is commonly covered with clouds. Many of the Indians are successful cultivators, and much mandioca and rice are produced. Immense woods exist in the province.

Reconeave is properly only the country which extends round All Saints Bay, but as the coast south of it to Point Matia enjoys the same advantages of climate, agriculture, and commerce, we have included it in this district. Many islands lie within and near the mouth of the bay, the chief of which is Itaparica, 23 miles long, at the two ends of which are two channels of entrance into the bay. The soil of this island is fertile, and planted with cocoa-palms, mangoes, jacars, and oranges. Many small rivers and creeks open into the bay, which render it very favourable for commerce. The Reconeave has a healthy climate, an excellent soil, and plenty of water. The winter or rainy season begins about the end of March, and continues till August, with considerable intervals of dry weather. In the other months the sky is commonly without a cloud, but thunder-storms are frequent; and these, as well as the breezes and heavy dews, moderate the summer heat and support vegetation. The soil is fertile, and yields grapes and other fruit, rice, mandioca, sugar, tobacco, and cotton. The cultivation of these, as well as the fisheries that are along the coast, render the Reconeave one of the busiest parts of South America.

The remainder of the province, which is altogether of a

different character, comprehends the mountains and the sertões. The latter are open dry plains on the backs of the mountains or between their ridges, and afford at certain seasons abundant pasture to numerous herds of cattle. The supply of rain and moisture is very irregular, and the crops uncertain. Some places, especially in the more narrow valleys, are wooded, and contain a better soil; and in such the few towns of this region have been built. Here mandioca, vegetables, fruits, and cotton are raised.

Among the rivers which water this province, the Rio San Francisco is by far the largest. Before it arrives at its boundary this river has already run about 500 miles from its source, which lies to the south of Villa Rica in Minas Gernas, and it continues its course between Bahia and the sertoe of Pernambuco for at least 600 miles. In its course through Bahia it is too much interrupted by rapids to be available for navigation. The next river in size is the Itapicema, about 250 miles long.

The lakes of Bahia are not numerous nor of great extent. The largest is that of Itahype, between the Rio de Contas and the river Ilheos. It is very deep, 7 miles in circumference and 3 in length, with a small island in the middle. It is bordered with extensive woods and forests, from which several small streams flow into this lake.

The Bahia and San Francisco Railway, 78 miles in length, and belonging to an English company, was opened in 1863; and in 1880 the Imperial Government completed its extension to the margin of the river San Francisco—a distance of over 200 miles.

Among the spontaneous products are ipericanha, Jesuits' bark, jalap, tamarind, Brazil root, turmeric, betony, copal, dragon's blood, mastic, copaiba, Brazil-wood, bow-wood, iron-wood, oil wood, cashew-nut, mayha, and palm. There are also many leafless parasite plants, which intertwine among the forest trees, and produce an almost impervious network. The zoology of this region includes only a small supply of domestic animals. Among wild animals, the tapir, the omece, the boar, and the deer are the most numerous species and the most hunted. Monkeys of different kinds are common in the woody districts. Parrots, and some other birds more distinguished by the beauty of their plumage than by their song, are found in all parts of the province. Among the snakes some are poisonous. Various species of bees produce honey, some in the cavities of the trunks of the trees, as in Poland and Russia, others in little hives of wax which they form in the twigs. Sharks are abundant, and most of the rivers are well stocked with fish. There are diamond mines in the province; but its mineral wealth is but partially explored, and still more partially utilized.

BAHIA or **SAN SALVADOR**, a large seaport town, until 1763 the capital of Brazil, is built on the eastern shore of the strait leading from the Atlantic to the fine harbour of Todos os Santos, or All Saints Bay, and a little north of the lighthouse on Cape San Antonio, which stands in 13° 0' S. lat., 38° 30' W. lon. It is about 880 miles N.N.E. of Rio de Janeiro. The largest vessels can enter the bay, which presents a capacious basin with several islands and harbours, a depth of water varying from 8 to 40 fathoms, and ample room and shelter for all the fleets in the world. Several rivers run into it, a circumstance which accounts for the current that generally flows past Cape San Antonio, and which, when the rivers are flooded, is very strong. The usual place of anchorage is opposite the city to the north and south of Fort do Mar, which is built on a small rocky islet. Three miles to the north-east are yards for the construction of merchant shipping.

Opposite to the anchorage lies the city, which consists of two towns, the Cidade Baixa, or Praya, and the Cidade Alta, or the lower and upper town. Communication between the two is effected by large flights of steps, and also by a powerful hydraulic elevator. The Praya (beach),

or lower town, is built on a strip of low land so narrow as to admit only of a single street, except in the middle, where five short streets branch off eastward. It is the seat of commercial activity, where the large warehouses and business places are situated, as are also the quays, docks, and custom-house. The sailors, porters, and lower classes generally reside here. Among the buildings, the Exchange and the Church of Nossa-Senhora are distinguished by their architecture. The latter has a front of European stone, and a richly decorated interior. At the southern extremity of the Praya lies the imperial dock-yard and the arsenal. At the back rises a precipitous hill. Some parts of the declivity are covered with buildings, but the steeper portions are planted with bananas and orange trees.

On the top of the hill stands the Cidade Alta, on an undulating surface, from 100 to 300 feet above the sea level. Most of the streets are wide and straight; the houses are built of stone, and from two to five stories high. The centre of the town lies in a depression, and contains the best streets, and several squares, among which is Praça de Parada, where the palace of the governor, the town-hall, the mint, and the court-house are situated. The most remarkable building is the college of the Jesuits, with the contiguous church, which is magnificently decorated and used as a cathedral. The college contains a public library of 12,000 volumes. The greater part of the building is, however, appropriated to a military hospital. Of the other churches, more than thirty in number, that of the Italian Capuchins is the most important. Other remarkable public buildings are the city hospital, the school of surgery, theatre, and the palace of the archbishop. Within the circuit of the town there is a considerable number of gardens and orchards. At the south-eastern extremity of the Cidade Alta is the *Passeio Público*, or public walk, on one of the most elevated eminences of the town, from the pavilion of which the whole bay, with its green islands, and the Atlantic Ocean, can be seen. The city is strongly fortified.

The population of Bahia is about 129,100, the majority of whom are negroes. The city is the oldest in Brazil, having been founded in 1547 by Thomas de Souza, first captain-general. It is now an important commercial centre. Lines for general traffic lead into the interior, by which the foreign goods reach the place of consumption, and the produce of the country is brought to market. The exports consist of sugar, cotton, coffee, tobacco, cigars, rice, rum, molasses, tallow, hides, horns, cocoa-nuts, fancy woods, bullion, diamonds, tapioca, &c. The imports comprise different kinds of cotton fabrics, woollen stuffs and cloth, linen, iron, and tinware, provisions, flour, salt, fish, soap, wines, codfish, glass, leather, furniture, &c. The trade of Bahia has very much increased during the last twenty years, and the imports from Great Britain alone now average £1,000,000 per annum. The value of the exports to all countries, but chiefly to Great Britain and the United States, is about £1,500,000 per annum—sugar, tobacco, and coffee being the principal articles. In 1875 a very good system of street tramways was completed, and the city is lighted with gas by an English company. The shortest sea route from Bahia to Southampton is 4366 sea miles.

BAHRAICH, a district of Oudh, British India, in the Fyzabad division, under the jurisdiction of the lieutenant-governor of the North-western Provinces, lying between lat. 27° 4' and 28° 24' N., and between lon. 81° 5' and 82° 15' E. The area is 2645 square miles; and the population 800,000. The shape of the division is that of a regular isosceles triangle, with its base running south-west and the apex to the north-east. Bahraich forms the most northerly district of the Fyzabad division or commissionership, and is bounded on the north by the

independent state of Nepal, on the east by the district of Gonda, on the south by Gonda and Bara Banki, and on the west by Sitapur and Kheri—the Kauriala or Gogra River forming the boundary.

The physical features of the district are well marked by the course of the Gogra and Rapti rivers. A belt of comparatively high land, raised about 40 feet above the level of the surrounding country, of a uniform breadth of 12 or 13 miles, and a total area of about 670 square miles, runs through the district in a south-easterly direction, forming the watershed between the two rivers. The great plain of the Gogra stretches away from the southern edge of this strip of upland down to the river itself, which flows along the western boundary of the district, at a distance from the plateau varying from 10 miles in the north to 35 in the south.

The principal agricultural staples of the district are rice, Indian corn, barley, and wheat. Two great harvests are raised during the year—the *kharif* or winter, and the *rabi* or spring crops. Irrigation is largely practised. The condition of the peasantry is better in Bahraich than in any other part of Oudh. Rents are generally paid in grain at the rate of one-half the crop raised. A system of modified serfage is common here, as in other districts east of the Gogra, by which a man receives an advance from a farmer of a sum varying from £3 to £10, and practically becomes his bond serf for life, receiving, however, one-sixth of the crop which he raises. The usual rate of wages for agricultural labour is 1½d. a day in money, with an allowance of parched grain, generally maize, worth about 1s. a month.

The trade of the district consists principally of the export down the rivers of grain, clarified butter (*ghi*), and timber. Piece goods, salt, and pulses form the chief imports. The timber chiefly comes from the Nepal forests, whence it is floated down the Kauriala and Rapti.

The climate resembles in some points that of Bengal, being cooler than in districts south of the Gogra, but more moist and enfeebling. The average annual rainfall is 45 inches. The prevalent diseases are fever, diarrhoea, goitre, and skin disorders.

BAHRAICH, the chief town and administrative headquarters of the district, is situated on the road from Bahraighat to Nepalganj, and has a population of 20,000. The residences of the European officers, and the government buildings, lie on a high bank above the old bed of the Gogra (Ghagra). As a commercial town, Bahraich seems never to have thriven. The principal building of interest is the shrine of Masaud, a famous warrior and saint, who invaded Bahraich about 1033 A.D., and who, after several victories, was defeated and slain by the confederate Hindu princes. The shrine is maintained by the reputed descendants of some servants of the hero; and 150,000 pilgrims, both Mohammedans and Hindus, visit the place during an annual fair held in the month of Jaishtya. Tombs of his principal followers are also objects of veneration.

BAHR-BELA-MA ("the Waterless Sea"), a remarkable valley in the Libyan Desert, on the borders of Egypt, about 50 miles W. of Cairo. It runs westward of and parallel to the valley of the Natron Lakes, from which it is divided by a sandy ridge. The valley is very deep, and about 9 miles in breadth; it is totally barren and waterless. It has, however, the appearance of having been once a watercourse, and is strewn with loose stones, quartz, silex, fragments of jasper, &c. There is also a quantity of petrified wood, trunks of trees, and large splinters.

Bahr, the Arabic word for the sea, a lake, or a large river, appears as a component part of many proper names in eastern geography; as *Bahr-al-Kolzum*, "the Sea of Kolzum," the Arabian Gulf or Red Sea, especially its north-western extremity; *Bahr Lût*, "the Lake of Lot,"

the Lacus Asphaltites or Dead Sea, in Syria; *Bahr-al-Abiad*, "the White River," and *Bahr-al-Azrak*, "the Blue River," the two principal southern branches of the Nile. The diminutive of *Bahr* is *Roheirah* or *Roheirat*, "a small lake." It has passed into the Portuguese language under the form *albufeira*, "a reservoir," "a tank," "a lagoon;" and into Spanish under the two forms *albufera* and *albuhera*, in the same sense. The prefixed *al* in these words is the Arabic definite article. The letter *h*, of many Arabic words that have been received into the Spanish and Portuguese languages, has been changed into *f*.

BAHR-EL-TOUR SINAI. See ARABIA.

BAHREIN' ISLAND, otherwise called *Arad*, is situated in the Persian Gulf. It is 27 miles long, and about 10 broad. A range of moderately high hills runs through the centre of the island, but the shores all round are very low. The island is fertile, and covered with plantations of date trees. The climate is mild, but humid and rather unhealthy. The soil is generally fertile, and produces rice, pot herbs, and fruits—especially citrons. There are numerous springs of excellent water in the interior, but at too great a distance from the shore to be available for shipping. Drinking water for the port of Manama is brought up in skins by divers from the bottom of the sea at the depth of 18 feet, where there is a spring of good fresh water.

Bahrein is surrounded by flats, one of which, called Teigmouth Shoal, extends from the island 15 miles to the northward, with a breadth of 14 miles; many parts of this shoal are dry at low water. The chief town, called Manama, is at the north-east extremity, and has a population of 25,000. The bazaar is well supplied with cattle, sheep, poultry, fish, and vegetables; and a very considerable trade is carried on. Upwards of 140 vessels of various sizes are employed in trading; but the pearl fishery is of the greatest importance to the island, which in the season employs 2400 boats, each containing from eight to twenty men. The annual produce of these fisheries amounts to between £100,000 and £200,000. There is a small town, called Ruffin, 7 miles S. of Manama; near it there are extensive ruins. The inhabitants of the island are a mixed race of Arab, Omani, and Persian. They possess great activity and intelligence, and are well known in the ports of the Persian Gulf for their commercial and industrial ability.

The island of Arad, lying close to the northward of Bahrein, is very low, and nearly divided into two by the sea at high water. At its south-west extremity is the town of Maharag, about a mile to the eastward of Manama. Communication is constantly kept up between the two places by means of ferry boats, the distance across being only 900 yards. The distance from the west coast of Bahrein to the Arabian shore is only 10 miles, and between the two lies a small low island called Jebel Hussein, which is not inhabited.

BAI'Æ, a seaport and a celebrated watering-place of the ancient Romans, which was situated on the west shore of the Bay of Naples, between the Lucrine Lake [see *AVERNUS*] and Cape Misenum, and opposite to the town of Puteoli (now Pozzuoli), from which it was distant about 3 miles across the water. The ground on which Baiæ stood is supposed to be that crescent-like sweep of coast between the base of Mount Grillo, which divides it from Lake Averno and the promontory on which the present Castle of Baja stands. It is a narrow semicircular slip, about a mile in length and confined between the hills and the sea. Here the wealthy Romans built their villas and baths, and for want of space often encroached upon the sea. This is alluded to by Horace:—

"Marisque Baiis obstrepentis nrages
Summoveve littora,
Partim locuples continenta ripâ." II. Od. 18

No sooner, however, had opulence withdrawn her powerful hand than the sea gradually resumed its old domain; moles and buttresses were torn asunder, washed away, or tumbled headlong into the deep, where, several feet below the surface, pavements of streets, foundations of houses, and masses of walls, may still be described. The only remains above ground are three or four circular buildings, commonly called temples, but two of which at least were apparently *thermae*, or warm-baths. The whole country is full of mineral springs. The baths, sometimes called Tritoli, and sometimes the Baths of Nero, although there is no reason for believing that they were constructed by that emperor (Paoli, "Antichità di Pozzuoli"), are two separate buildings near each other.

The attractions of Baia were its mild climate; its situation, protected by hills from the blasts of the north and of the south west winds, and open to the eastern breeze, which is freshened by blowing across the bay; a sea generally smooth; abundant hot-springs; and a delightful view. These were the charms which made opulent men, tired of the bustle and the heat of Rome, resort to Baia for quiet and health. "Nothing in the world can be compared with the lovely bay of Baia," exclaims Horace's wealthy Roman (Epist. i. 85), who is desirous of erecting a magnificent villa there. As the resort of the idle and wealthy it soon acquired the reputation of being a hotbed of vice, and Seneca persuaded everyone who wished to be able to control his passions to keep away from it.

The whole coast of Baia is now almost a desert, the modern village of Baja being an insignificant collection of mean hovels. The numerous springs, being neglected, have oozed down the declivity of the hills, and formed stagnant pools, the exhalations of which render the upper air unwholesome in summer. The ground is strewn with foundations and remains of walls, bricks, cement, and pieces of marble. Under the water, near the shore, canoes, carnelians, and other valuable stones have been found.

The name of Gulf of Baja is now applied to the extent of sea between Cape Misenum and the point of Pozzuoli, which affords a good anchorage to large vessels and men-of-war, while the Bay of Naples is exposed to the *libeccio*, or south-west wind.

BAIGORRY, VALLEY OF, in the department of Basses Pyrénées in France. This valley commences at the frontier of France and Spain, and is about 11 miles long and 8 broad. It is watered by a little stream, the Hourepetca, which falls into the Nive, a tributary of the Adour. The principal place in the valley is St. Etienne-de-Baigorry, which has a population of 2600. There are rich copper and iron mines in this valley, and large copper and iron works for smelting and refining the ores.

BAIKAL LAKE (the Dalai-nor or "Holy Sea" of the Mongolians) is by far the largest fresh-water reservoir in Asia. It is situated in the Russo-Siberian government of Irkutsk, and sweeps S. and S.W. in the form of a circle from 103° to 110° E. lon.

The lake fills two enormously deep fissures in the plateau, at an elevation of 1363 feet above the sea. It has a mean depth of 850 feet, sinking in some places to 4500, or considerably over 3000 below the sea-level. Owing to this enormous depth its volume, with an area of scarcely over 14,000 square miles, is more than double that of Lake Michigan, which has an area of 23,000 square miles, but a mean depth of only 300 feet. A rocky ridge, about 3350 feet high, divides the lake into two secondary, but now united basins, at a point where there is a depth of scarcely more than 200 feet. The water is unusually transparent, and reveals objects at a depth of from 40 to 50 feet.

On the north-western shores of the lake, the mountains, which encircle it so closely as to constitute in many parts the very shores, are interrupted by only one narrow and

deep crevice, which occurs towards the western extremity of the lake, and by which the Lower Angara carries off the surplus waters. The scenery here is very grand, the rocky granite masses being in many places clothed with larch and pine from their summits to the water's edge. The shores abound in hot springs. Mr. Chersky's explorations in 1881 showed that the rocks on the west side of the lake belonged to three different epochs—Laurentian, Silurian, and Jurassic. Numerous streams descend from these heights into the lake, but all of them have a short course, and are only torrents, which, however, commonly flow even in the hottest summer. The mountain ranges which inclose the eastern and southern sides of the lake, advance in many parts as close to its shore as those on the other sides of the lake, but they are more broken into bays and capes; and, besides, there are two large openings and one narrow opening in them. About 180 rivers empty themselves into the lake, of which the largest are the Selenga and the Orkhon.

The summer at Lake Baikal is very short, and the nights are cold and often frosty; sometimes it begins to snow in August, or at latest in September. In the bogs and morasses ice is always found, even during summer heat. The lake is never covered with ice before the middle of December, often only in the beginning of January, which must be ascribed to its great depth and its troubled surface. It may be traversed on sledges up to the end of April, or even the beginning of May. No traces of the approach of spring are discovered before the middle of April, and this season shows itself in its vigour only at the end of May or the beginning of June.

The lake produces abundance of fish, of which the chief are the sturgeon, salmon, and seal. It forms an important link in the communication between Russia and China. It is traversed by sledges in winter and by steamers in summer, which has added greatly to the trade.

BAIL (from Old French *bailier*, to keep in custody, derived from Low Latin *bailare*, to carry about as a nurse does a child) is a technical term used both in English and Scotch law; but in England it applies both to civil and criminal procedure, whereas in Scotland it applies exclusively to the latter. It signifies the sureties who become responsible for the appearance of a defendant, arrested by legal process, to answer to the complaint made against him; and they are so called because anciently the defendant was *baillé*, delivered or committed to the custody of his bail, who were bound to produce him at the time appointed for his appearance.

In civil cases the sheriff is compelled to admit to bail all persons arrested by him in any personal action on reasonable sureties being offered for their appearance, and is liable to an action if he refuse to do so. One surety is legally sufficient, but in accepting one only the sheriff does so at his own risk. On the other hand, he may insist on two or more, according to their circumstances. Those persons who enjoy privilege from arrest, such as peers, members of Parliament, ambassadors, &c., cannot become bail, inasmuch as a plaintiff is entitled to require the security of persons who are amenable to the ordinary process of the courts.

All personal actions are now commenced by writ of *habeas corpus*, and the cases in which a defendant may be held to special bail in civil causes are confined to those which are fully specified in the third section of 1 & 2 Vict. c. 110. It is thereby enacted that if a plaintiff, in any action in any of the superior courts of law in which the defendant is now liable to arrest, shall show by affidavit to the satisfaction of a judge of one of the said courts that such plaintiff has a cause of action against such defendant or defendants to the amount of £20 or upwards, or has sustained damage to that amount, and there is probable cause for believing that the defendant or any one or more of the defendants is or are about to quit England, unless he or they be forth-

with apprehended, such judge may order the defendant or defendants to be held to bail in any sum he may think fit, not exceeding the amount of the debt or damages. This order may be made at any time between the commencement of the action and final judgment. The plaintiff may thereupon sue out a writ of *capias ad respondendum*, and arrest the defendant, who, when so arrested, is to remain in custody till he shall have given a bail-bond to the sheriff, or shall have made deposit of the sum indorsed on such writ of *capias*, together with £10 for the costs.

By section 6 of the Debtors Act, 1869, incorporated in order 69 of the rules of the Supreme Court, 1883, it is provided that upon special application and affidavits, a warrant may be issued for an absconding debtor's arrest to the prescribed officer of the court, indorsed in the same manner as a writ of *capias*. This warrant may be executed at any time within seven days from its date inclusive; the officer executing it must detain the debtor until he has paid the debt and costs indorsed in the warrant, or given bail, according to the practice of the superior courts, or is otherwise lawfully discharged. The warrant may be executed in any part of England, and can be transmitted, if necessary, from the bailiff of the county court whence issued to the bailiff of any other county court within the district of which the debtor is supposed to be; and such latter bailiff may lawfully execute it, as though it had been directed to him by the judge of the county court out of which it issued. But as this warrant is only auxiliary to the process under 1 & 2 Vict. c. 110, s. 3, before described, it becomes void and of no effect as a protection to the creditor, unless a *capias*, and in cases where no action was pending in the superior courts, a writ of *summons* therein be forthwith issued and served, within seven days from the date of the warrant inclusive. Upon such service of the *capias* the debtor is deemed to have been arrested by virtue of it, and all proceedings must be had upon it as if it had been issued prior to the issuing of that warrant, and according to the ordinary practice. If the debtor, upon his arrest under the warrant, pays the debt and costs, and is accordingly released from custody, the *capias* must be issued, but need not, of course, be served. The debtor when arrested may at once pay the debt and costs indorsed on the warrant to the officer duly arresting him, or enter into a bail-bond to him with two sufficient sureties for the amount indorsed, conditioned to put in special bail as required by the warrant, or to make deposit of the sum so indorsed, together with £10 for costs, and thereupon he is entitled to be discharged from custody.

Bail in Error.—By the Common Law Procedure Act, 1852, s. 151, it was enacted that upon judgment thereafter to be given in the superior courts, execution should not be stayed or delayed by proceedings in error, or supersedeas thereupon, without the special order of the court or a judge; unless the person in whose name such proceedings in error be brought, with two, or, by leave of the court or a judge, more than two, sufficient sureties such as the court should allow of, should, within four clear days after lodging the memorandum alleging error, or after the signing of the judgment, whichever shall last happen, be bound unto the party for whom any such judgment is given by recognizance, to be acknowledged in the same court in double the sum adjudged to be recovered by the said judgment, to prosecute the proceedings in error with effect, and also to satisfy and pay (if the said judgment be affirmed or the proceedings in error be discontinued by the plaintiff therein) the sum and costs adjudged upon the former judgment, and all costs and damages to be also awarded for the delay of the execution. By order 58, rule 1, of the rules of the Supreme Court of Judicature proceedings in error are now abolished, but relief is afforded on nearly similar lines to the foregoing by way of appeal.

Bail in Criminal Cases are the sureties given to the crown by a person accused of a crime, and who is allowed by a court or magistrate to be at liberty till trial, on giving security for his appearance. By the common law all accused persons, even though charged with heinous felonies, were allowed the privilege of bail, till the crime of murder, and afterwards treason and other felonies, were excepted by statute. The provisions of all previous statutes respecting bail were superseded by the 11 & 12 Vict. c. 42, s. 23, by which it was enacted that any person charged before a justice with any felony (not being treason), or with any assault with intent to commit a felony, perjury or subornation of jury, concealing the birth of a child by secret burying or otherwise, wilful and indecent exposure of the person, riot, assault in pursuance of a conspiracy to raise wages, assault upon a police officer in the execution of his duty, or upon any person acting in his aid, neglect or breach of duty as a peace officer, or any misdemeanour for prosecution of which the costs may be allowed, may be bailed at the discretion of the justice or justices. By s. 21 provision is made for bailing persons remanded for further examination. In cases of treason the justices have, as before stated, no power of taking bail, but such power is reserved to a secretary of state or to a judge of the High Court. The recognizance of bail is conditioned for the appearance and surrender of the person charged at the time and place of trial, and for his then and there pleading and taking his trial, and not departing without leave. Bail may at any time seize and surrender their principal, and thus discharge themselves. In ordinary practice it is unusual for justices or magistrates to admit to bail in any case of felony, unless there are circumstances of an exceptionally favourable kind.

The Act last referred to applied only to the taking of bail by justices of the peace, and did not affect the authority of the superior courts. By the common law the latter courts had various degrees of power as regarded the admission of prisoners to bail—just as the authority of each court was limited to some particular class of suits. The Court of Queen's Bench had more extensive authority than the Common Pleas, Exchequer, or Chancery Courts, and could bail a party committed for any crime whatever, even for treason or murder; and it exercised this authority in capital cases when circumstances raised a presumption of the party's innocence. The Judicature Act, which came into operation in November, 1875, moulded the various superior courts into one High Court of Justice, all the judges of which were invested with equal power and jurisdiction. For the more speedy despatch of business, however, most of the former divisions were retained under their respective names. The Queen's Bench Division still takes cognizance of the cases in which it would be most likely necessary to exercise the extensive powers of bail formerly vested only in the court of that name; but those powers are not now limited to any special division of the High Court. No judge can bail prisoners suffering under the sentence of a competent court of crime, or for a contempt of the authority of the High Court, unless it is made to appear that they are innocent, or unless a prisoner's life is in danger from the effects of continued confinement.

Metropolitan police magistrates have special powers of bailing persons charged before them, even upon their sole recognizance, without surety; and the Metropolitan Police Act empowers a constable, on duty at any police station in London, to take bail from persons charged with petty misdemeanours without warrant of a justice.

Bail can be given only by householders or possessors of a freehold, who may be required to show that they have property enough to meet the amount of their bail. Whenever a magistrate, in the exercise of his discretion, declines to admit a prisoner to bail, appeal can be made to the judges of the Queen's Bench Division.

In Scotland the use of the term bail is confined to the criminal courts, the corresponding term for civil process being *Cautio*. In criminal proceedings all offences that are not capital are bailable by the magistrates, sheriffs, and judges, but these officials have no power to admit to bail in capital offences. The High Court of Justiciary, however, is not restricted in this manner, and it possesses power to admit to bail even in capital offences, and to fix the amount at discretion. A similar authority is vested in the lord advocate, but only under very extraordinary circumstances would such power be exercised.

BAILIE, a Scotch term generally used to designate a magistrate of a municipal corporation holding an office analogous to that of an alderman in England. He is invested with statutory powers, and in common law is held to have the same power within his territory that a sheriff has in his county. The chief magistrate of a Scottish corporation, entitled the provost, is by virtue of his office in the commission of the peace, one or more of the bailies being generally associated with him. The hereditary keeper of the abbey or sanctuary of Holyrood, appointed by the Duke of Hamilton, is called the bailie of the abbey, and has jurisdiction in civil debts contracted within the precincts. Formerly the term was also used to designate the officer who, in conveyancing, represented the seller and delivered the lands to the buyer or his attorney, but the passing of the "Titles to Land Act," 21 & 22 Vict. c. 76, has rendered this office unnecessary.

BAILIFF, a keeper or superintendent, from the Old French *baillif*, a custodian (Low Latin, *baillare*, to carry about as a nurse does a child, whence *baulus*, a porter). All the various officers who are called by this name have some kind of superintendence intrusted to them by their superior. The sheriff is called the queen's bailiff, and his county is his bailiwick. The keeper of Dover Castle is called the bailiff; and the chief magistrates of many ancient corporations in England had this name. Amongst the principal officers of corporate towns to which the inquiries of the Corporation Commissioners extended in 1835, there were 120 officers called bailiffs, and 45 inferior officers with the same designation, besides 29 water-bailiffs. But the chief functionaries to whom the name is applied in England are the bailiffs of sheriffs, the bailiffs of liberties or franchises, and the bailiffs of lords of manors, and the bailiffs of the county courts.

1. *Bailiffs of sheriffs* were anciently appointed in every hundred, to execute all process directed to the sheriff, to collect the king's fines and fee-farm rents, and to attend the justices of assize and gaol delivery; they are called in the old books bailiffs-erant. The bailiff derives his authority from a warrant under the hand and seal of the sheriff; and he cannot lawfully arrest a party till he receives such warrant. It is a contempt of the court from which process issues to hinder the bailiff in executing it; and when a party is taken by the bailiff he is legally in the custody of the sheriff. The bailiff is forbidden to execute process on Sunday; and he is not authorized to break open an outer door to make an arrest under civil process, or to seize goods; but if the outer door is open he may break open inner doors in execution of the process. If a bailiff misdeemean himself grossly in the execution of a process, he will be punished by attachment from the court from whence the process issues.

2. *The bailiff of a franchise or liberty*, is one who has the same authority granted to him by the lord of a liberty as the sheriff's bailiffs anciently had by the sheriff. See *Lantern*.

3. *Bailiffs of manors* are stewards or agents appointed by the lord (generally by an authority under seal) to superintend the manor; collect fines and quit-rents; inspect the buildings; order repairs; cut down trees; impound cattle trespassing; take an account of wastes, spoils, and

misdeemeanours in the woods and demesne lands. See *Manors*.

4. *Bailiff of the county court* receives his authority from the high bailiff of the court, and his duties are the same as those in the superior courts.

BAILIWICK (from the French *bailli* and the Saxon *vic*, the dwelling-place or district of the bailiff) signifies either a county which is the bailiwick of the sheriff, as bailiff of the queen, and within which his jurisdiction and his authority to execute process extend; or it signifies the particular liberty or franchise of some lord who has an exclusive authority within its limits to act as the sheriff does within the county. The corresponding French word is *bailliage*. See *BAILIFF*, *SHERIFF*.

BAILLEUL, an old town in the department of Nord, France, 15 miles N.W. of Lille, and 4 miles from the Belgian frontier. Its church is a very ancient structure. There are some tanneries, and manufactures of thread, lace, and cotton and woollen goods. The population in 1883 was 11,500.

BAIL'IE, GENERAL, the officer in command of the Scotch army which Cromwell completely routed at Preston, 17th August, 1648. Neither Field-marshal Lesley nor General David Lesley was present. General Baillie was a cousin of ROBERT BAILLIE "the Covenanter," and had been in many wars at home and abroad, suffering defeat once at the hands of Montrose. It was Baillie who determined the Duke of Hamilton (commander-in-chief of the Scotch forces, numbering about 40,000) to march into Lancashire after he had crossed the border at Annan. Prince Charles appeared off Yarmouth, and again in the Downs, ready to take advantage of any success attending the Scotch attempt to "deliver the king from the hands of sectaries," and tumults arose at Colchester, in Kent, and in Wales. Cromwell had quelled the last and most important, and hurried northward to join his friend General Lambert, and oppose the Scotch. The duke's army marching in very loose order by Preston, Cromwell, with a small compact force of 8600, fell upon that part of the army commanded by Baillie, about 21,000 strong, and cutting it to pieces, drove the expedition north and south in most unexpected fashion. Calendar carried away the duke and the vanguard; and as an eye-witness informs us, "the lieutenant-general of the foot (Baillie) did receive an order to make as good conditions for himself and those under him as he could; for the horse would not come back to him, being resolved to preserve themselves for a better time. Baillie was surprised with this, and looking upon that action which he was ordered to do as full of dishonour, he beseeched any that would to shoot him through the head. At length, being much solicited by the officers that were by him, he wrote to Cromwell, and within two hours all were Cromwell's prisoners." (Memoirs of Sir James Turner repub. Edin., 1829.) Turner himself refused to surrender, and rode away, "carrying my wounded thigh with me," to join the duke and vanguard at Uttoxeter, in Staffordshire, whereabouts all were captured on 25th August. The rearguard, under Monro, on hearing of the disaster paused uncertain, a day's march behind, then returned to Scotland, plundering by the way. "Surely, sir," writes Cromwell to Speaker Lenthall, "this is nothing but the hand of God."

BAIL'IE, JOANNA, a distinguished poetess, was born at Bothwell, near Glasgow, in 1762. Her father, the Rev. James Baillie, was a Scotch Presbyterian clergyman, and a descendant from the celebrated Baillies of Jarvis-woode, while her mother, Dorothea Hunter, was sister to the great anatomists William and John Hunter. She received a superior education, and gave early promise of considerable poetic talent, though her first work was not published until 1798. Her brother, Dr. MATTHEW BAILLIE, having settled in London as a physician, she removed with her sister Agnes to Hampstead, where they passed the

remainder of their lives. Of a gentle and affectionate disposition, she enjoyed in a full degree the esteem and respect of her contemporaries in literature, and the home of the sisters at Hampstead became the centre of a literary society, which included many distinguished authors both of England and America. Her first publication was the first volume of the "Plays on the Passions," which she described as "a series of plays in which it is attempted to delineate the stronger passions of the mind, each passion being the subject of a tragedy and a comedy." To this a second volume was added in 1802, and a third in 1812. In 1804 she published a volume of "Miscellaneous Plays," and in 1810 the "Family Legend," a drama founded on a romantic Highland tradition. This was brought out at Edinburgh, Mrs. Siddons sustaining the principal female character, and was very well received. Another drama, entitled "De Montfort," had a short run in London, being played for eleven nights, the principal part being taken by John Kemble. When an attempt was made to reproduce it in 1821 for Edmund Kean, he pronounced it to be a fine poem but not fitted to be an acting play; and though Miss Baillie had intended her dramas for the stage, and never abandoned the hope that they might become favourite acting plays, the great majority of readers have confirmed this judgment. It is now generally admitted that the principle adopted by the authoress was an erroneous one, and that the exhibition of a character wholly dominated by a single passion gives an air of unreality to the conception, by presenting an impersonation of one of the elements of human nature rather than a complete human character, while it of necessity causes a narrowness of treatment and a lack of varied incident. These productions are, however, interesting as studies in psychology, and are full of high poetic feeling and power. In addition to those mentioned, Miss Baillie published three volumes of dramatic poetry in 1836, and a volume of miscellaneous poetry, which included some beautiful songs, in 1841. She died at her home at Hampstead, 23rd February, 1851, at the age of eighty-nine. A new edition of her dramatic and poetical works was published in one volume in 1851, and "Fugitive Verses" in 1860.

BAILLIE, DR. MATTHEW, an eminent anatomist and physician, was born in 1761, at the manse (or parsonage) of Shotts, in Lanarkshire. His mother, Dorothea Hunter, was sister of the celebrated anatomists William and John Hunter. His father having been elected professor of divinity in the University of Glasgow, his education was carried on in that place. His sister was the dramatist JOANNA BAILLIE.

Though originally inclined to adopt his father's profession, or to enter the bar, his uncle, Dr. William Hunter, held out such inducements as determined him to choose the medical profession. This celebrated man, at that time the most eminent teacher of anatomy in London, was desirous of superintending the education of his nephew in person, a scheme which was only partially practicable, as, in order to obtain a degree of doctor of medicine from one of the English universities, it was necessary that part of his time should be spent at Oxford or Cambridge. He obtained an exhibition to Balliol College, Oxford, which is in the gift of the professors of the University of Glasgow.

On his way to Oxford he visited London, and for the first time saw his distinguished uncle, from whom he received directions respecting his studies, which he prosecuted for an entire year at Oxford. But subsequently he visited the university only at term time, spending all the intervening periods in London. Two years after he had commenced his studies in London, he became a teacher in his uncle's anatomical theatre in Great Windmill Street, in the capacity of demonstrator. About a year after this time Dr. William Hunter died, and bequeathed to his nephew the use of his splendid museum, his anatomical

theatre and house in Great Windmill Street, as well as a small estate in Scotland (which Baillie generously gave up to his uncle, John Hunter) and an annuity of £100 a year. Dr. Hunter, a short time before his death, told his nephew "that it was his intention to leave him but little money, as he had derived too much pleasure from making his own fortune to deprive him of doing the same."

In 1785, two years after William Hunter's death, Baillie, in conjunction with Mr. Cruickshanks, gave his first course of anatomical lectures, thus in his twenty-fifth year taking upon himself the task of supplying the place of one whose talents as a lecturer were of the first rank. He formed a museum of great value, which he presented to the College of Physicians of London, along with £400 to keep it in a proper state of preservation.

In 1787 he was appointed physician to St. George's Hospital, and two years afterwards he received his degree of Doctor of Medicine from the University of Oxford. To render the collections of his uncles, as well as his own, useful to the public, he undertook an examination of them, and in 1795 published his "Morbid Anatomy." It was soon translated into French (two translations) and Italian, and into German by Professor Sömmerring. About four years after the appearance of this work he began to publish engravings for its illustration. These, as well as the work itself, will remain a lasting memorial of the zeal, the industry, and the talents of their author.

His physical frame was feeble compared with his mental powers. He was under the middle stature, and of rather a slender form. His countenance was marked with a great deal of sagacity and penetration. He continued (with a few occasional exceptions) in the unremitting exercise of his profession till the spring of the year 1823, when he became affected with chronic inflammation of the trachea (windpipe), for which he went to Tunbridge, and afterwards to his estate in Gloucestershire, where he died in the sixty-third year of his age. His friends erected a monument to him, with a suitable inscription, in Westminster Abbey.

BAILLIE, ROBERT, commonly called *Baillie the Covenantanter*, was born in Glasgow in 1602; was educated first at the grammar-school and afterwards at the University of Glasgow; probably in 1623 or 1624 he entered into holy orders; in 1625 he was admitted one of the regents (as the professors were then styled) of the college; and this situation he held till the year 1631, when he was presented to the parish church of Kilwinning in Ayrshire. At this time Baillie's sentiments on the subject of church government were extremely moderate; his ordination had been Episcopal, and he was attached on principle as well as by education and habit to that form of polity, which was indeed at this time the established ecclesiastical system in Scotland. But when Charles I. made his attempt in 1636 and 1637 to impose the new service-book and canons upon the Scottish Church, Baillie was induced to attend a meeting of the Supplicants, as the opponents of the obnoxious measures called themselves, which was held at Edinburgh on the 18th of October, 1637. He signed the Covenant, which at first he had regarded with suspicion; and from this time he took his place as one of the chief managers and leaders of the Presbyterian and anti-court party.

In 1630 we find Robert Baillie under arms, "but I promise, for the offence of no man except a robber in the way," with Field-marshal Alexander Lesley and the Covenanters; and his expression, "that old, little crooked soldier," has passed into history along with Lesley, whom it describes. In 1640 Baillie published what may be considered to have been an extension of his speech at the meeting of Supplicants. In the following October, when the Scotch had taken arms, he proceeded, on the invitation of the Earls of Rothes, Montrose, and Argyle, to the council of war at Newcastle,

taking with him a number of copies of his book. He was nominated one of the four clerical commissioners who were deputed, with nine laymen, to proceed to London, under the protection of the great seal, to negotiate a treaty with the king. The four ministers, besides acting as chaplains to the other commissioners, were sent specially to convert the English Puritans to Presbyterianism, as we learn from Baillie—"I myself for the convincing of that prevalent faction against which I have written" (Arminian Episcopalists, namely). He reached London on the 16th of November, and remained there till the beginning of June, 1641, having during his residence witnessed the trial of Strafford and other remarkable occurrences, of which his letters contain very detailed and graphic accounts. In June, 1642, Baillie was appointed professor of divinity in the University of Glasgow; but immediately after this he was again despatched to England as one of the five clerical commissioners from the General Assembly to the Westminster Assembly of Divines. He reached London on the 18th of November, and his stay this time lasted for more than two years. After the execution of the king he was one of two clergymen sent over to the Hague, in March, 1649, with the commissioners of the Scottish Estates (or Parliament) to enter into negotiations with Charles II. When Cromwell advanced upon Glasgow, in October, 1650, after the battle of Dunbar, Baillie fled to the Isle of Cumbræ with Lady Montgomery, but left, he tells us, all his family and goods to Cromwell's courtesy, "which," he adds, "indeed was great; for he took such a course with his soldiers that they did less displeasure at Glasgow nor [than] if they had been at London, though Mr. Zachary Boyd railed on them all to their very face in the High Church." In church politics Baillie now allied himself with the more moderate party. Immediately after the Restoration he was appointed principal of the University, Patrick Gillespie, one of the chief leaders of the party opposed to Baillie, being dispossessed of that office. He did not, however, long enjoy this preferment, having died about the end of August in the following year. Fortunately for posterity, a cousin of Baillie's, a "Reverend Mr. Spang" (or Strang, according to the British Museum MS. copy), was Scotch minister at Campvere, in Holland, in the early times of the rebellion, and Baillie wrote to him and others upon all great occasions sheet upon sheet (in a vile handwriting), taking trouble furthermore to copy the hasty, bubbling correspondence—often intolerably dull, always verbose, and missing what we most desire to know, but always veracious, and beyond price on that account. A complete edition of "Baillie's Letters" was produced under the care of David Laing, Esq., in three volumes (Edinburgh, 1841).

BAILLY, JEAN SYLVAIN (1736–1793), an eminent French astronomer, president of the National Assembly of 1789, and mayor of Paris during the Revolution, was originally intended for the profession of an artist, but an accidental acquaintance formed with Lacaille caused him to devote himself to astronomy. He was admitted a member of the Academy of Sciences in 1763, and in 1764 was one of the candidates for a prize offered by that society for the best dissertation on the theory of the satellites of Jupiter. The prize was gained by Lagrange, but the attempt of Bailly immediately placed him among the successors of Newton. His essay on the light of the satellites of Jupiter, which he had measured by finding how much the object-glass of a telescope must be diminished in order to make these bodies disappear, appeared in 1771. In 1775 he published the first part of his "History of Astronomy." The whole of this work was completed in 1787 by the appearance of his "Indian Astronomy;" and the supplementary works which at different times came from his pen were "Lettres sur l'Atlantide," 1779; "Lettres sur l'Origine des Sciences," 1777; "Essai sur

l'Origine des Fables et des Religions Anciennes," written in 1781–82, published posthumously in 1799. Their author was a candidate for the secretaryship of the Academy in 1771, at which time Condorcet was preferred by the exertions of D'Alembert. But Bailly was elected to the Académie Française in 1784, and to the Académie des Inscriptions, &c., in 1785, he and Fontenelle being the only two instances of Frenchmen who belonged at once to all the three academies, and himself the only academicien whose bust adorned their library during the life of the original. His reports to the Academy of Sciences on animal magnetism (1784), and on the plan of a new Hôtel-Dieu (1786) were much admired, as well as his "Éloges" of Charles V., Molière, Corneille, Laennelle, Leibnitz, Cook, and Gresset.

Bailly, as a writer, is one of the most interesting and elegant among men of science. On the history of science no man has treated so as to approach him in the agreeable qualities of style. But his whole system is built upon surmises or conjectural interpretations of fact. He imagines that he sees, in the early science of all nations, rather the ruins of some complete system than one in process of formation; and he supposes, therefore, that some nation, whose name is now lost, is the common original of the Egyptian, Chaldean, Hindu, and Chinese astronomy. On this supposition he speculates most agreeably, and, as has been wittily observed, gets every point connected with his primeval people except their name and existence.

At the election of the States-General in 1789, Bailly was the first chosen for Paris. He was chosen president of the Tiers-État (17th June, 1789), the day after that body declared itself "the National Assembly." He held this office during the memorable sittings at the Tennis-Court on the 20th; at the Church of St. Louis on the 23rd of June, during the personal attempt of the king to disperse the Assembly; at the consolidation of the three orders on the 27th; and till 2nd July. His conduct pleased the people of Paris, who elected him mayor of their city on the 15th of July, being the time when the king visited Paris after the fall of the Bastille (14th July). At this period Mirabeau, Lafayette, and Bailly were the three most marked men of the Revolution; and Mignet calls the first the tribune of the people of Paris, the second the general, and the third the magistrate.

During the period of his mayoralty no accession to any violent measure distinguished Bailly's conduct; the most remarkable proposition he made to the Assembly (5th June, 1790) was that for the celebration of the taking of the Bastille. He completely satisfied neither extreme, being charged with devotion to and contempt of the royal cause respectively by the two parties. On 18th November, 1790, Mayor Bailly walked to the Palais de Justice quite quietly, and sealed up the papers of the ancient *Parlement*, which had endured so many centuries. The unostentatious way in which so momentous an act as the dissolution of this historic body was accomplished, is eminently characteristic of the man. We must pass over the events of his life until we come to that of the 17th of July, 1791. The attempt at escape on the part of the king, so fatally famous, had irritated the Republican party, and the gathering of foreign troops on the frontier had lent colour to their violence. A tumultuous assembly, headed by all the chiefs of the Jacobins (as they were afterwards called), assembled in the Champ de Mars to petition for the dethronement of the king. These were, after remonstrance, fired on by the National Guard under Lafayette and Bailly. The account of Bailly himself is that the firing took place against his consent, and that only twelve persons were shot. The measure of the 17th was approved by the Assembly, but Bailly offered his resignation on the 19th of September, and finally relinquished the mayoralty on the 16th of November. He either travelled abroad or retired to Nantes,

according to different accounts, till towards the middle of 1793. During this time he compiled memoirs of the Revolution and its causes, which were published in 1804.

The execution of Louis XVI., on the 21st of January, 1793, made Bailly feel that a man so much the object of enmity to the ruling faction as himself could no longer live openly in France. He wrote to his fellow-philosopher Laplace, who had retired to Melun, wishing to know whether he might safely come there. Laplace answered that he might; but, in the meanwhile, the insurrection of the 31st of May established the armed power of the Jacobins by the overthrow of the Girondins, and Laplace wrote again to Bailly, warning him not to come, as a detachment of the revolutionary army was at Melun. In spite of this warning he had the imprudence to venture. He was recognized by a soldier in the streets, seized, and conducted, after some delay, to Paris. He was charged, as well with the affair of the 17th of July already alluded to, as with conspiring in favour of the late royal family. Being produced as a witness on the trial of Marie Antoinette, he denied all accession to any scheme of the latter nature, and declared his conviction of the falsehood of all the charges brought against the queen. His own trial took place on the 10th of November, two days after that of Madame Roland. The day preceding he published his justification, which is to be found in the "Procès Famineux," vol. ii. The same day or the next day (accounts differ) he underwent the usual fate, attended by circumstances of unusual cruelty. The conduct of the people towards him excited the indignation even of the executioners. A cold, bitter, drizzling rain fell on the poor old man of 57, and when the end of the long bitter journey was reached, amid the curses of the enraged people, they insisted that the scaffold should be removed to the Champ de Mars, the scene of the events for which he was to suffer. When there, it was once more removed beyond the boundary of the sacred spot, which was not to be profaned by the blood of such a criminal. The detested drapene rouge was burned literally before his face. Under these insults, lasting for hours in all, his demeanour is represented as having been perfectly calm; and he is said to have answered the remark, "Bailly, you tremble!" addressed to him by one of his persecutors, with, "My friend, 'tis with cold." "Crueler end had no mortal," says Carlyle ("French Revolution," book v.)

BAILMENT is a term derived from the French word *bailler*, to deliver, and may be defined to be "a delivery of a movable thing for a particular purpose, upon a contract, express or implied, that the purpose shall be carried into effect, and that, when that is done, the goods shall be restored, by the bailee or person to whom they are delivered, to the owner or bailor, or according to his directions." The English law of bailment is said to be founded upon the Roman law, and the most convenient mode of classifying the different species of bailments to be that suggested by Sir William Jones in his "Essay on the Law of Bailments." The following outline is according to his method.

1. *Depositum* is a mere delivery or simple deposit of a movable thing to be kept by the bailee for the bailor without remuneration. The obligation of the bailee is to return the thing upon demand. He is not liable for the loss or injury of the property deposited with him, unless he was guilty of wilful abuse, fraud, or gross negligence. The measure of diligence required from the bailee in cases of mere deposit is that which a prudent man would use in his own affairs. A person with whom a thing is deposited does not thereby acquire any right to use it. His agreement is to keep and preserve the thing without any advantage of any kind. Some things which are called deposits are in fact loans, and may be used. If a man deposits with his banker a sealed bag of gold, he may demand back that bag of gold; but if he gives the banker coin not sealed up, or bank notes, or checks, or a bill of exchange

duly endorsed, this transaction, though it may be called a deposit, is a loan, and the banker may use the money.

2. *Mandatum* (the mandate of the Scotch law) means an agreement on the part of one man with another to do some legal act for another, without any remuneration. The acceptance of the commission implies an undertaking to do so much towards the execution of it as a man would do if he were performing his own work. Gross negligence or breach of faith are the only grounds upon which a mandatum can be charged with a loss.

3. *Commodatum* is a loan of a movable thing, to be used by the person to whom it is lent. If a chair, a book, or any other article is lent for the accommodation of the borrower, he is bound to redeliver it in as good condition as it was in when delivered to him, subject only to the deterioration produced by the ordinary and reasonable use of it for the purposes of the loan. The borrower is answerable for the slightest neglect. It is not sufficient to exonerate him from responsibility for the loss or injury of the article borrowed, that he has taken as much care of it as of his own property. It is his duty to apply the utmost care of a vigilant man. If things be stolen from the borrower he must indemnify the owner, unless he has observed the greatest care, and used all proper precaution to prevent the occurrence.

4. *Vadium* is a delivery of goods in pledge or pawn as security for some debt or engagement; but this is properly discussed under PLEDGE.

5. *Locatio* is of two kinds. (1) There may be bailment of goods to be used by the hirer for a compensation to be paid by him to the owner; or (2) a delivery of goods for the purpose of having work done upon them, or of being safely kept for the owner, and in each case for a payment to be given or made to the bailee by the owner; or a delivery of goods to be carried for hire from one place to another.

As to the first of these divisions, the hirer of goods for a payment to the owner is bound to keep them with that degree of care which a careful man uses in keeping his own goods. "If, therefore, I hire a horse, I am bound to treat it with the same care as a man of common prudence would apply to his own horse. If I hire a house, lodging, or carriage, I must take the same care of them, and of the conduct of my servants and family respecting them, as all prudent men would do of their own property."

The second kind of bailment comprises the case of manufacturers and artisans, who have materials delivered to them to work up; and also the case of innkeepers, carriers, factors, wharfingers, and warehousemen. But innkeepers, factors, and carriers, are subject to various liabilities by Acts of Parliament and ancient customs. [See CARRIER, FACTOR, INN.] Generally speaking, all bailees of this description are bound to take *ordinary* care of the things respectively bailed to them. With respect to manufacturers or artisans, they are not only bound to keep with ordinary care the goods deposited with them to be worked upon, but they must also apply a degree of skill equal to the performance of the particular kind of work respectively committed to them. If a man delivers cloth to a tailor to make it into a coat, and if, for want of having the ordinary skill of his trade, he cuts it so as to spoil the cloth, he must make good the loss.

BAILY, EDWARD HODGES, R.A., a distinguished British sculptor, was born at Bristol in 1788, and died in London, 22nd May, 1867. His father, who was a ship-carver of great repute, destined him for a commercial life, but even at school the boy showed his natural taste and remarkable talents by producing numerous wax models and busts of his school-fellows, and afterwards, when placed in a mercantile house, still carried on his favourite pursuits. Two Homeric studies executed for a friend were shown to Flaxman, who bestowed on them such high commen-

dation that in 1807 Baily came to London and placed himself under the great sculptor. Among his best works may be named "Eve at the Fountain," "Eve Listening," "The Sleeping Nymph," and the "Girl preparing for the Bath."

BAILY, FRANCIS, was born 28th April, 1774, at Newbury in Berkshire, his father being a banker there.

It is the peculiar part of Mr. Baily's history, that while actively engaged in business as a stockbroker, in which he accumulated a large fortune, he gained a first-rate reputation in one species of mathematical application, and laid the foundation of another, to be completed after his retirement from the stock exchange at the age of fifty-one.

He published many treatises on leases, annuities, assurance, &c., before his retirement from business in 1825. From this time till his death, he was engaged with all the energy of his character in the promotion of astronomy. Between the ages of fifty-one and seventy, when most men in his circumstances would have been enjoying the leisure to which commercial men above all others are apt to look forward, he did the work of a lifetime. He was, in 1820, one of the founders of the Astronomical Society. He also was one of those who exerted themselves to produce a reformation and enlargement of the *Nautical Almanack*, and whose efforts did at last prevail upon the government to place it upon its present distinguished footing. The Astronomical Society's catalogue of stars was the suggestion of Mr. Baily and Mr. Gompertz, and was superintended by Mr. Baily. He superintended the construction of tables, founded on Lalande and Lacaille, containing 57,000 stars, and he left the preface completely written. These catalogues were afterwards published. A minute account of all his writings is given in a Memoir by Sir John Herschel, read before the Astronomical Society in 1844.

Mr. Baily died on the 30th August, 1844. His last public appearance was at Oxford, on the 2nd of July, to which place he went, with some difficulty, to receive the honorary degree of Doctor of Civil Law. He was never married.

BAINES, EDWARD, author of the "History of the County Palatine of Lancaster," proprietor and editor of the *Leeds Mercury*, and representative of the borough of Leeds in three Parliaments, was born at Walton-le-Dale, near Preston in Lancashire, on the 5th February, 1774. Having been apprenticed to a printer he removed to Leeds in order to obtain a better knowledge of his business, and in 1801 he became proprietor of the *Leeds Mercury*. The newspaper at that time had a very small circulation, and like nearly all other provincial newspapers at that day, was without editorial article or reporter, security in its dimensions, and possessing little that could inform or influence the minds of its readers. Mr. Baines was one of the public writers who, by their abilities and character, raised the provincial press nearly to a level with the metropolitan; and during almost half a century, by his personal exertions and his pen, he exercised an important influence in the great county of York on behalf of Liberal politics and all social improvement. A Congregational dissenter, he was also an earnest advocate for perfect civil equality of all religious communities. Among the valuable institutions which he assisted to establish were the Royal Lancasterian School, the Philosophical and Literary Society, the Mechanics' Institution, the Model Infant School, Fever Hospital, and Temperance Society. When the borough of Leeds was enfranchised under the Reform Act he actively promoted the return of Lord Macaulay for that borough, and on the retirement of that gentleman was returned himself in 1834. He was re-elected in 1835 and 1837, but withdrew owing to failing health in 1841. In Parliament he sat as an independent Liberal, and exercised considerable influence as an advocate of the dissenters. He died on the 3rd of August, 1848, in his seventy-fifth year, and was honoured by a public

funeral, a marble statue to his memory being placed in the town-hall.

BA'INI, GIUSEPPE, a musician and writer on music, was born at Rome on the 21st October, 1775, and died there on the 10th May, 1844. He sang as a boy in the pontifical chapel, where he was afterwards retained as a bass, when he became celebrated for the singular beauty of his voice and the excellence of his style, and in 1817 was appointed director. He received his first instruction in counterpoint from his uncle, Lorenzo Baini of Venice, and continued his study of composition under Giuseppe Zannacconi, whose friend and pupil he became in 1802. He is best known as a composer by his "Miserere," produced in 1821, which was long performed in the Sistine Chapel on Holy Thursday, in alternation with that of Allegri and that of Bai. Baini is chiefly distinguished, however, by his writings upon music, which display a depth of knowledge, a diligence of research, an enthusiasm for his subject, and a mastery of diction that have gained him the highest esteem. His principal work was his biography of Palestrina, and collection of the works of that master. It was printed in 1828 (two vols., Rome), and is one of the most valuable authorities on musical history extant. It was republished by Kiesewetter in German, with additions by Franz Kandler (Leipzig, 1834), and by Winterfield (Breslau, 1832).

BA'IRAM is the designation of the only two festivals annually celebrated by the Turks and other Mohammedan nations. The first is also called *Id-al-Fitr*, "the festival of the interruption," alluding to the breaking of the universal fast which is rigorously observed during the month Ramazan. It commences from the moment when the new moon of the month Shewal becomes visible, the appearance of which, as marking the termination of four weeks of abstinence and restraint, is looked for and watched with great eagerness. The second festival, denominated *Id-al-Azhá* or *Kurbán Bairám*, "the festival of the sacrifices," is instituted in commemoration of Abraham offering his son Isaac, and is celebrated seventy days after the former, on the 10th of Zulhijjah, the day appointed for slaying the victims by the pilgrims at Mecca. The festival lasts four days. At Constantinople the two bairáms are celebrated with much pomp.

BAIRD, SIR DAVID, Baronet, General in the British army, and K.C.B., was born on the 6th December, 1757, at Newbyth in Scotland. He entered the service at fifteen years of age as an ensign in the 2nd Regiment of foot, and obtained a company in 1778 in the 73rd Highland Regiment. In 1779 Captain Baird accompanied his regiment to India, and was present at the disastrous affair of Peramboum, on the 10th September of the next year, when a handful of British troops, after a most gallant defence, were perfidiously slaughtered by the army of Hyder Ali. Captain Baird was here wounded and taken prisoner. After his release from prison Baird visited England, and returned to India in 1791 with the rank of Lieutenant-colonel. As brigadier-general he was engaged in active service under General Harris in the war with Tipoo Saib.

After various successes the British army encamped under the walls of Seringapatam, a fortress of great strength, and defended by a numerous and confident army. General Harris determined to take it by storm; and the conduct of the dangerous enterprise was, at his own solicitation, intrusted to Baird, now major-general. The arrangements for storming were completed on the 4th May, 1799, and one o'clock of that day was fixed upon for the assault. It was successful, and Baird took as his headquarters the palace of Tipoo, who was among the slain. He assumed the governorship of the town he had captured; but he was next day abruptly commanded to deliver up the keys of the town to Colonel Wellesley, who, as it happened, had no active share in the capture. After services in Egypt, and again in India, he returned to Europe on leave, in 1802.

In 1805 General Baird commanded an expedition directed against the Dutch settlements at the Cape of Good Hope; he took Cape Town, and was proceeding to organize his conquest when he was recalled for having sanctioned an ill-judged expedition of Sir Home Popham against one of the possessions of Spain in South America.

In 1807 he accompanied the expedition against Denmark. In 1808 he commanded a large force that was sent out to co-operate with Sir John Moore in Spain. On the death of that able commander, General Baird, as second in command, became commander-in-chief, and the despatch relating to the battle was accordingly written in his name. He was, however, too severely wounded to take advantage of the accidental promotion, even had circumstances been otherwise favourable; for he received some grape-shot in the left arm, which so shattered the bone of the arm and shoulder that amputation from the socket became necessary. On his return he received the thanks of Parliament for his gallant conduct, was gratified with the long-sought-for red ribbon, and created a baronet. He died in 1829.

BAIREUTH or **BAYREUTH**, the capital of the circle of Upper Franconia, in Bavaria, is pleasantly situated on the Red Main, about 115 miles N. of Munich, and 40 N.N.E. of Nuremberg. Baireuth is an open, cheerful, well-built place. It has six gates; the streets are broad, regular, and well paved; and it is embellished with gardens, groves, promenades, and public fountains. The most remarkable buildings are—the Residenz, or old palace, formerly the margravit residence, and its church with an octangular tower of freestone; the new palace; opera house, which is one of the largest in Germany; barracks; mint; town-hall; and market-place, in which are three handsome fountains. Besides the palace church and the Gothic church of St. Mary Magdalene, erected in 1446, there are six other churches and a synagogue in the town. The celebrated author Jean Paul Richter passed the last twenty years of his life at Baireuth, and died there in November, 1825. A monument is erected to his memory in the cemetery. Baireuth was chosen by Wagner as the scene of his musical festivals and a theatre was erected for his special use in 1876. The remains of the great composer were conveyed from Venice, where he died in 1883, and interred at Baireuth. The town is a railway junction, and the centre of administration for the province. There are tanneries, manufactories for making tobacco-pipes, parchment, linen, porcelain and earthenware, cottons, and stockings; and the inhabitants carry on considerable trade in grain and flour. A road, bordered with trees, leads to the suburb of "St Georgam See," on the Red Main. About 4 miles distant are the beautiful park, temple, gardens, and waterworks of Eremitage, the retreat of the former margraves of Baireuth. The population of Baireuth in 1880 was 22,500.

BAJA or **BAS**, a town of Hungary in the county of Bacs, near the Danube, 20 miles N. by W. of Zombor. It is the seat of the courts of justice for the county, has a Catholic and a Greek church, a synagogue, and a Catholic gymnasium. It carries on a considerable trade in grain and pigs, and there are four great fairs annually. The town is situated in the midst of a rich vine-growing region. Population, 19,000.

BAJAZET I., or **BAYAZID**, surnamed *Ildirim*, or "the Lightning," in allusion to the rapidity of his military achievements, was the son of the sultan of the Ottomans, Murad I. He was born in 1347, and came to the throne in 1389, after his father had been killed in an engagement with the Servians near Cossowa. The early part of Bajazet's reign was chiefly spent in completing and consolidating the conquests in Western Asia, and in a war with Stephen, prince of Moldavia. In 1393 he took possession of the towns of Saloniki and Yenishehr (Larissa), and for the first time besieged Constantinople. He compelled the emperor to give up his plan of adding to the

strength of the capital by new fortifications, and to assign a separate suburb to the Turks, with a mosque and a *cadi* or judge of their own. Bajazet at the same time built the fort of Guzeldje, on the eastern side of the Bosphorus, which secured to him the command of that channel. In 1396 he gained an important victory near Nicopolis on the Danube over an army of 100,000 Christians, including many of the bravest knights of France and Germany, who had assembled under the standard of Sigismund, king of Hungary, to check the further progress of the Mohammedan power in Europe. The greater part of the Christian forces were slain or driven into the Danube. Sigismund escaped to Constantinople. This great victory was soon followed by further conquests in Greece. The Morea was taken, and in 1397 Athens fell under the power of the Ottomans. The dominions of Bajazet and those of the Tartar conqueror, Timur, now touched each other in the neighbourhood of Erzeroum and on the banks of the Euphrates. With doubtful limits between the two empires, which had never been defined by treaty, a cause for war between two jealous sovereigns could not long be wanting. The two sovereigns at the head of their armies met in the plains of Angora, the capital of the ancient Galatia. A decisive battle took place, 20th July, 1401, in which the Ottomans were totally defeated, and Bajazet became a prisoner in the hands of Timur. His treatment is a matter of dispute; but Sir William Jones, on the authority of a contemporary historian, Ibn Arabshah, maintains "that Timur did inclose his captive, Ildirim Bajazet, in a cage of iron." He certainly died in captivity about 1403. Bajazet was succeeded upon the throne of the Ottoman empire by his son Mohammed I.

BAJAZET II., the eldest son of the Ottoman sultan Mohammed II., was born A.D. 1447, and in 1481 succeeded his father on the throne of the Ottoman empire, which he occupied till 1512. He had to contest the throne with his brother Zizim or Zizymas, who was defeated in a battle at Yenishehr, near Broussa, 20th June, 1481, and fled to Egypt. In the following year Zizim made another unsuccessful attempt, and fled successively to Rhodes, to France, and to Rome, where he is said to have been poisoned, 24th February, 1495. A considerable part of Bajazet's reign was spent in war against the republic of Venice, the Mameluke sultan of Egypt, and Persia, in which no event of any great interest took place. In 1490 the first treaty was concluded between the Ottoman government and that of Poland; and in 1495 we find recorded the first diplomatic relations between the sultan and the Czar of Moscow. The last years of his reign were disturbed by the rebellions of his sons, till at length the youngest, Selim, prevailed, and supported by the Janissaries and the great mass of the people of Constantinople, ascended the throne, 26th April, 1512. Bajazet quitted the capital in order to spend the remainder of his life in retirement at Demitoka, his birthplace; but he died on his way thither at Aya, near Hassa, 26th May, 1512.

BAJUS, MICHAEL (a Latinized form of the French *De Bay*), a distinguished theologian of the Roman Catholic Church, was born at the village of Melin, in the province of Hainault, in 1513. He studied at Louvain, where he was afterwards appointed professor of divinity, and ultimately chancellor and inquisitor-general. His university, under the influence of Philip II., sent him as its deputy to the Council of Trent, 1563-64, where he took a prominent part in the proceedings. Bajus was an earnest student of the Scriptures and of the writings of St. Augustine; the latter he is said to have read through nine times, and his system of theology founded upon the works of that father was strongly opposed to the Pelagianism that then prevailed in the Roman Catholic Church. Eighteen propositions, advanced by him and his colleague Hessels, were condemned by the Theological Faculty of Paris in 1560. In 1567 he was formally accused at the court of Rome, and

seventy-six propositions extracted from his works were censured by Pope Pius V., who, however, refrained from naming the author. The Jesuits and Franciscans, however, were not disposed to let the matter rest; and the Jesuit Lalez brought the matter again before the Papal chair, and the seventy-six propositions were condemned by a bull of Gregory XIII. in 1580. Bajus, while retaining his doctrines, made such formal submission as was required of him, and retained his position in the university. He died 16th September, 1589, in the seventy-seventh year of his age. His works were published in part at Cologne in 1695 (two vols. 4to), but the pope forbade their circulation. The teachings of Bajus were adopted in great part by the Jansenists, and were called for a time, after his name, *Bajuanism*.

BA'KARGANJ, a district of British India, in the Lieutenant-governorship of Bengal, lying between $21^{\circ} 49'$ and $23^{\circ} 4'$ N. lat., and between $89^{\circ} 53'$ and $91^{\circ} 4'$ E. lon. The area is 4066 square miles, and the population 900,000. It forms the southernmost district of the Dacca division, and is bounded on the north by the districts of Dacca and Faridpur; on the east by the Meghna and Shahbazpur rivers, separating it from Noakhali and Tipperah; on the south by the Bay of Bengal; and on the west by the Jessor and Faridpur districts. The administrative headquarters are at Barisal, the chief town of the district, situated on the river of the same name. Bakarganj is a typical part of the alluvial delta formed by the three great river systems of Bengal. It is watered by the united streams of the Ganges, Brahmaputra, and the Meghna, and is traversed by innumerable rivers and water-courses, forming a most intricate network of channels, which are ever changing their courses. The whole district presents the appearance of an unbroken level, although there is a very slight and gradual decline from the east towards the west and north-west. The level of even the highest part of the district is only just sufficient to protect it from ordinary floods, while the western and north-western parts lie so low that the water of the numerous channels and streams collects in extensive marshes and swamps. These are often of great size and depth, abound in fish, and frequently during the rainy season overspread the adjacent country. On the southern face of the district, bordering on the Bay of Bengal, lies the Bakarganj portion of the sundarbans, or sea-board jungles; but in many parts the land has now been cleared almost to the sea. The river system of Bakarganj consists of the offshoots from the great estuary of the Meghna, and the tributaries and distributaries of the Ariai Khan and the Baleswar, the two other principal rivers of the district. The numerous names given to these rivers in different parts of their courses cause great confusion. The same perplexing multiplicity of names extends even to the smallest *khal*, or water-course, which the villagers on one side often call by a name quite different from that by which it is known on the other. These *khals* intersect the district in every direction, and are so numerous that it is difficult to go for any distance except by boat at any season of the year. Indeed, there are hardly any roads in the district, and every peasant has his own boat, in which he moves from place to place. The few trading villages to be found in the district are invariably situated on the banks of a stream, but the inhabitants do not like to congregate in villages. Each man builds his homestead on his own land, generally on the highest spot in his holding, without any reference to his neighbours; and as a rule, therefore, the homesteads are apart from each other. They are surrounded with dense plantations of coco-nut and betel-nut palms and bamboos, presenting a very picturesque appearance. The only forests in the district are in the southern sundarbans tract, where they yield an abundant supply of timber and firewood, and some honey and wax, and give shelter to tigers, leopards,

and other wild animals. Game-birds are very numerous in the district, and fish abound in all the streams—many of which also often contain formidable crocodiles. Marabouts, kingfishers, flamingoes, cranes, pelicans, and wild geese are killed for the sake of their plumage, which is sent to Calcutta.

Rice forms the staple crop of the district, and is, indeed, the only cereal grown to any extent. It consists of three sorts—aman, or winter rice; aus, the autumn crop; and boro, or spring rice. These are subdivided into more than a hundred well-recognized varieties. Among the other crops of the district are mustard, pulses (*khesari* and *musuri*), linseed, betel-nuts, cocoa-nuts, sugar-cane, safflower, and pan. Jute is grown extensively in the northern part of the district. Of the total area nearly three-fourths are under cultivation. The condition of the peasantry is on the whole satisfactory; almost every man has his own little plot of ground, on which he grows sufficient for the wants of his family.

Bakarganj is subject to floods, which often cause much injury. They are generally occasioned either by the rising of the rivers before they enter the district, or by the high tides which accompany cyclones.

The climate is considered one of the healthiest in Eastern Bengal, owing to the strong south-west monsoon which blows up fresh from the sea, and keeps the atmosphere cool. But the heavy rainfall and consequent humidity of the atmosphere, combined with the use of bad water, act as sources of disease. The principal endemic diseases are fevers of all kinds and cholera; the latter disease and small-pox occasionally occur as epidemics.

BAKEWELL, a very ancient town of Derbyshire, is beautifully situated on the west bank of the Wye, 22 miles N.N.W. from Derby, and 145 miles from London by the Midland Railway. The town contains a parish church, of which the nave is of Saxon architecture, but the other parts are of later date. It was thoroughly restored in 1846. Bakewell has a very neat and clean appearance, and is much visited by tourists on account of the fine scenery in the vicinity, and by anglers for fishing. It is also a favourite summer residence, and a resort of persons desirous of using its chalybeate, spring, and warm baths, which were known in the time of the Saxons. Many of the inhabitants are employed in turning, polishing, and inlaying the black marble found in the neighbourhood. Near the entrance to the town is a cotton mill, on the site of one established by Arkwright. The parish contains many other townships besides Bakewell. The population of Bakewell in 1881 was 2502.

Three miles N.E. of the town is Chatsworth, the splendid seat of the Duke of Devonshire, on a gentle rise near the base of a finely wooded hill; the Derwent, spanned by a handsome stone bridge, flows past its principal front. The mansion forms a square of 190 feet, inclosing a spacious court, with a fountain in the centre; it has a flat roof surrounded by balustrades, and is decorated with Ionic columns. At the principal entrance a grand flight of steps leads to a terrace extending the length of the building. The water-works are considered amongst the finest in Europe. The present edifice stands on the site of the mansion built by Sir William Cavendish in the sixteenth century, in which Mary Queen of Scots was imprisoned thirteen years. It was completed in 1706, but a wing and other additions were made to it in the present century. Altogether it is one of the noblest residences in the kingdom, and contains a very large collection of pictures, statues, and articles of vertu.

Haddon Hall, the property of the Duke of Rutland, the most perfect of the ancient baronial mansions remaining in the kingdom, is about 2 miles S. of Bakewell, on an eminence overlooking the fine vale of Haddon. It was built at different periods; the most ancient part in Edward III.'s reign; another in that of Henry VI.; and the most

modern in the reign of Elizabeth, at which period it came into the possession of the Manners family. It is not inhabited, and for the most part is stripped of furniture, but it is kept in good repair, and the public are allowed access to three-fourths of the buildings.

BAKHTEGAN is the name of a salt lake in the province of Fars, or Persia proper. It is now called Deryâ-i-Niriz, or the Lake of Niriz, from the principal town in its vicinity. It is 42 miles long, 2½ broad, and 122 in circumference. The river Kur or Bundemir falls into it. The lake is often nearly dry in summer.

BAKTCHEIS' SERAI (Turkish, "the Garden Palace"), a town in the Crimea, of which it was formerly the capital, but is now included in the circle of Simferopol, which forms part of the Russian government of Taurus. It is situated in a long deep valley, between two mountains, and is built in an irregular manner upon each side of the sloping ground which descends to the Tehuruk-Su, a rivulet that flows into the Katcha. The origin of the town is unknown, but in the fifteenth century it was the residence of the Tartar khans, and its chief objects of interest are the remains of its splendour under the Tartar dynasty. The principal building, the palace, or Khan Serai, was built in 1519, and was restored for the reception of the Empress Catherine. Besides churches and a synagogue there are more than thirty mosques—the population still consisting chiefly of Tartars—Catherine II., in 1783, having granted them the exclusive right of habitation in the city. The town thus presents a great contrast to the other towns in the Crimea, and is altogether one of the most singular in Europe. The main street is about 2 miles in length, and in this the principal buildings are situated. The other streets are mere lanes, dirty, crooked, and ill-built. The manufactures of the town consist of morocco leather, saddlery, "bouza"—a spirit distilled from millet—silks, knives, woollens, gold and silver plate, pottery, arms, tobacco-pipes, &c. The population amounts to 12,000, of whom about 2000 are Greeks, Jews, or Armenians.

BAKU'. The territory of this name, which is confined to the peninsula of Abosheron or Abshora, lies on the west side of the Caspian Sea, and is included in the Russian province of Transcaucasia (Daghestan). The surface is generally level; the soil is rocky and sterile, without one attractive spot in its whole extent, and without any water but that which is drawn from wells, and this has a salt disagreeable flavour. Not a tree exists upon it; but portions of the territory have a layer of mould, on which wheat, barley, and maize, melons, fruits, rice, and cotton, and, on the highest ground, saffron, are raised. In some parts opium is prepared from poppy-heads; and a species of red and highly savoury onion, which is not found elsewhere, is cultivated under cover.

The peninsula is celebrated for its mud volcanoes, and for the superabundance of naphtha with which its soil is charged, particularly in the neighbourhood of the capital. It not only issues spontaneously through the surface, but rises wherever a hole is bored. Since proper machinery for boring and drawing the oil has been introduced, according to the most recent models adopted in America, the yield has been enormous, and large quantities are now sent to all parts of Russia. A railway between Baku and Batoum on the Black Sea was opened in 1883, by which the trade has been very considerably increased.

BAKU, the capital, possesses one of the best ports in the Caspian Sea. It was, however, formerly comparatively a village, but since the great increase in the oil trade it has grown to a city of 40,000 inhabitants, with fine mosques and bazaars, rows of elegant houses, and a fine esplanade.

In ancient times the Asjur-Meisjan, or burning field, was one of the most celebrated Ateeshyahs, or shrines of grace, among the Ghebers or Parsees; it was a spot to which thousands of fire-worshippers resorted.

BA'LA (Welsh, *Llanycil*), a market-town of Merionethshire, and a station on the Great Western Railway, is situated 18 miles N.E. from Dolgelly, at the north-eastern end of Bala Lake. In 1882 a line was opened connecting it with Festiniog. The town consists chiefly of one wide street, and contains a church, chapels, grammar-school, town-hall, and market-house. Close to the town is the Calvinistic Methodist College, erected in 1868; and there is also a training college of the Welsh Independents at Bala. Flannels, woollen stockings, and gloves are manufactured. The population of the town in 1881 was 1653.

BA'LA BEDS are so named from their occurrence near Bala in Merioneth. In this locality they consist of limestones and sandstones, intercalated with volcanic rocks. The limestone is full of fossils, amongst which "two genera of star-fish, *Protaster* and *Palæaster*, are found, the latter being almost as uncompressed as if found just washed up on the sea-beach" (Lyell). Contemporaneous beds are found on the sides of Caer Caradoc in Shropshire, the Caradoc Sandstone. The lower part consists of shelly sandstones, passing upwards into shales full of the beautiful trilobite, *Trinucleus concentricus*. In South Wales there is a great thickness of slaty and crystalline rocks, which are of the same age.

BA'LAAM, the name of an ancient heathen prophet, the story of whose connection with the children of Israel is recorded in the Book of Numbers, chapters xxii.-xxiv. According to the narrative of the Scriptures, Balaam was not ignorant of the attributes and worship of Jehovah, and indeed possessed a genuine prophetic gift; for under divine influence he blessed the people of Israel, whom he had come out to curse, and prophesied concerning their future history. Other references to him, however, in Num. xxxi. 16, Josh. xiii. 22, speak of him rather as a heathen soothsayer who advised Balak to introduce the worship of Baal-Peor to the Israelites by means of the seductions of the Midianitish women, and who was slain by the children of Israel in their successful war with Midian. This difference has been variously accounted for, and many different estimates of the character and position of Balaam have been advanced by biblical critics and expositors. Most modern scholars are disposed to regard the reference in Num. xxxi. 16, and Josh. xiii. 22, as being the earliest traditions concerning him, and to regard the story contained in Num. xxii.-xxiv. as the work of a writer who lived during the first half of the eighth century B.C. The references to Balaam in the New Testament take the unfavourable view of his character.

BALACLAVA is a port on the S.W. coast of the Crimea, on a small bay of the Black Sea, in the Russian province of Taurida. It has a harbour, capable of receiving ten or twelve large vessels, but with so narrow an entrance that not more than one vessel can enter it at a time. The Crimean War raised this small place into sudden importance, as the English expeditionary army established themselves in it, improved the harbour, built quays, constructed quite a town, with storehouses, hospitals, &c., and laid down a line of railroad to the camp, a distance of about 7 miles. On the signature of the treaty of Paris by the allied powers, in 1856, Balacava was restored to the Russians.

BALACLAVA, BATTLE OF. Soon after the occupation of the Crimea by the allied armies in 1854, the Russian garrison at Sebastopol received a reinforcement of about 50,000 men, under Liprandi. This enabled their generals, early on the 25th October, to send out a strong body of Russian horse, supported by infantry and artillery, to attack what was considered a weak point of the English position. It was a range of low hills facing the Tchernaya, upon four of which the Turks had constructed earthen redoubts, each being armed with two or three guns. The

Turks were speedily expelled from these defences, and took refuge on the flanks of the 93rd Highlanders, hastily drawn up by Sir Colin Campbell. These brave fellows received the Russian horse without changing their formation, and by their coolness and steady gallantry completely routed them. Thereupon the Russian cavalry retired into the valley, where they were charged by a small force of the Scots Greys and the Enniskillen Dragoons. These were joined by the 1st Royals and the 4th and 5th Dragoons, and in a short space of time 400 English cavalry dispersed a Russian corps three times more numerous. The heavy cavalry had nobly maintained their share of the day's proceedings, and it soon became the turn of the Light Brigade to achieve glory and renown. On its defeat, the Russian horse, with the infantry and artillery, retired down the valley towards the entrance of the gorge. Six battalions of infantry, protected by thirty guns, were drawn up in this position; and the hills at the side were covered with Russian infantry. At this juncture Lord Lucan received the memorable order from Lord Raglan, which, together with Captain Nolan's remarks, induced him to send word to Lord Cardigan to lead forth the Light Brigade to what seemed certain destruction. Upon that fearful exploit they advanced 670 strong. They had to charge an army in position, protected by a powerful artillery. When about 1200 yards from the foe, the Russian batteries poured forth a murderous volley, and many a gallant fellow was laid low. Nevertheless the survivors dashed on, cut down the artillerymen at the guns, and drove back the infantry. A corps of lancers was hurled upon their flank, and to their eternal disgrace the Russian artillerymen opened fire on friend and foe now engaged in a deadly struggle. The heavy cavalry came forward to cover their retreat; the French Chasseurs d'Afrique executed a brilliant charge on a battery on the left; and thus the remnant of the Light Brigade escaped. The affair lasted twenty minutes, in which time 400 men and nearly the same number of horses were destroyed. But the moral effect of the victory was wonderful, and the Russians dreaded an encounter with such troops. A splendid description of the battle is given in the fourth volume of Kinglake's "Invasion of the Crimea."

BALA'GHAT, a district of British India in the Chief-commissionership of the Central Provinces, lying between $21^{\circ} 18'$ and $22^{\circ} 22' N$ lat., and $80^{\circ} 3'$ and $81^{\circ} 4' E$. lon. It forms an irregular triangle, with its northern base resting on Mandla district, its western side bounded by the Bagh and Waingunga rivers, and its south-eastern by Rajpur district. The population is 200,000, and the area 2600 square miles.

From the river Bagh, lower Balaghat spreads in an open and fertile plain, fringed on its northern side with micaceous hill peaks and ridges, amid which a number of small valleys communicate with the highlands beyond. Higher up, the country is broken by a series of irregular mountain ranges, often sparkling with mica, and running generally towards the west. Numerous valleys wind among the hills, which attain a height of 800 or 900 feet above the plain, and nearly 2000 feet above sea-level. The soil varies from rich alluvial deposits to a strong clay not susceptible of cultivation. The greater part of the district is drained by the Waingunga and its tributaries, but a few of the streams which rise in the upper country find their way into the Nerbudda (Narbada). There are no lakes in Balaghat, but the undulating surface and the perennial hill streams afford great facilities for irrigation. This is effected by numberless tanks, which in many cases are emptied after the rains, and rabi crops are sown in their beds. The highlands are clothed with dense forests, and patches of scrub are scattered about the plains. On the banks of the Deo and the Son (Soane) is found the large *katang* bamboo, specimens of which have been exhibited 90 feet in length

The north of Balaghat is covered with forests; the finest of these is the large *sal* reserve of Topla, in the north-east corner, where the trees are magnificent. The jungle contains game of every description, from the bison, which ranges over the hill summits, to the fox and hare in the plains below.

The rainy season lasts from June to September. By far the most fatal complaint is fever, to which cause is attributed about 85 per cent. of the deaths throughout the district. Cholera and small-pox have been comparatively harmless, but dysentery and similar bowel complaints are responsible for a considerable number of deaths.

BAL'ANCE (from Latin *bi-lanx*, a two-scaled weighing machine—*bi*, double; *lanx*, a scale). The general meaning of the term applies to any state of things under which opposing circumstances just destroy the effects of each other; as when we speak of a balance of power, of good and evil, &c. Hence also the commercial meaning, in which the balance is not the state just mentioned, but the sum of money which must be added to one or the other side of an account, in order that the debts and credits may be *balanced*, or of equal amount. As an instrument of common use, the term *scale* is more frequently applied. See also LEVER, STEEL-YARD, and WEIGHING MACHINE.

A simple straight lever, balanced by weights resting immediately upon it, or suspended from it by strings, in such a manner that a common centre of gravity of the weights and lever may fall exactly on the fulcrum, or point of support, will remain at rest in any position; and the same may be said if the weights are so disposed that the centre of gravity of the whole is always in a vertical line passing through the fulcrum.

A pair of scales or balance should be so sensible that, when equipoised, a very small additional weight in either scale may overcome the friction and adherence of the pivot by which it rests; and the diminution of friction to the utmost possible extent is accomplished by giving the supports a high polish and attaching a knife-edged pivot to each side of the beam.

A balance should have what is called a *stable equilibrium*; that is, the beam when turned on its support from a horizontal position should immediately return and oscillate for a time about such position; and this is obtained by causing the centre of gravity of the beam and weights, when at rest, to be below the axis of support, and in a vertical line passing through that axis. The scales used in shops are in general sufficiently stable, but they are seldom very sensible.

The stability of a balance is estimated by the force with which the beam endeavours to recover a horizontal position after it has been made to deviate from it through some small angle, as one degree.

The sensibility of a balance is estimated by the angular deviation of the beam from a horizontal position when a very small weight is placed in one scale; thus, if one grain placed in a scale of each of two balances should make the beam of the first incline two degrees, and that of the second four degrees, the latter balance would be twice as sensible as the former.

From what has been said it follows—first, that other things remaining the same, the longer the arm of a balance is the greater is the sensibility; secondly, with the arm of a given length every increase of sensibility is a decrease of stability, and *vice versa*; thirdly, additional weight, either to the scale or beam (the arm remaining the same), is favourable to stability and unfavourable to sensibility; and, fourthly, whatever does not alter the length of the arm cannot be favourable to both at once.

Every balance has different degrees of sensibility and stability, with the different weights which are employed. But as, generally speaking, the quantities weighed in delicate balances are small, a balance which is highly sensible

when no weight is in the scales will be so for every weight with which it is intended to use it. A balance made by Ramsden for the Royal Society, weighing 10 lbs. altogether, turned with the ten-millionth of that quantity, or with about the thousandth part of a grain.

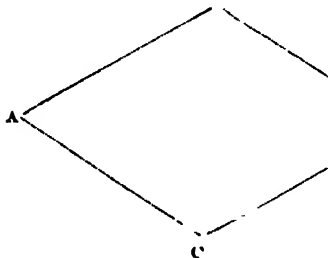
A highly delicate balance should be made as much as possible of brass. Steel and iron are apt to acquire magnetic properties. It should also be inclosed in a glass case, with doors for communication, and when not in use a little muriate of lime or any other strong absorbent of moisture should be placed in the case. A needle, which points either exactly upwards or downwards when the beam is horizontal, is usually attached to the beam, and a graduated scale of degrees is attached to the frame-work of the instrument, in such manner that the needle may point to zero when it is vertical. By the scale also it may be ascertained, before the balance comes to rest, whether horizontal equilibrium has been obtained; for in that case the needle will describe equal arcs on the graduated scale on each side of the zero point; while, if either scale be overloaded, the needle will move through more degrees on the side of that scale than on the side of the other.

It is impossible in practice to make a perfect balance; but the following simple method, imagined by Borda, obviates the difficulty, provided only the balance be sensible. Instead of weighing, say a lump of salt, against brass weights, when the scales must favour either one substance or the other, since no scales are perfect, weigh both the salt and the weights successively in the same scale against a third substance, as iron. It will then be of no consequence whether the weight of iron was truly equal to that of the salt or not; the weight of the salt and of the brass must be exactly the same, because, under the same circumstances, the two in turn counterpoise the same weight of iron.

BALANCE, ELECTRIC. The object of an electric balance is to measure the electric resistance of an unknown portion of a circuit along which a current of electricity passes. The best instrument is Christie's Electric Balance, commonly called Wheatstone's Bridge, since Wheatstone, and not the inventor, developed its great utility. Wheatstone's bridge plays the part of an ordinary balance in weighing a substance. A known quantity is put in one scale-pan, and varied by other known quantities until the unknown quantity is exactly counterpoised.

Resistance varies in various substances—some, as copper, offering scarcely any bar to the passage of electricity; others, as carbon, giving great resistance. Resistance is measured in *ohms*, an ohm being 1000 million "absolute units;" and the practical way of measuring is by balancing the unknown resistance against the known one of a "resistance coil" of german-silver, or silver-iridium, such as electricians make up to any required ohm-strength.

The mode of operation of the electric balance may be illustrated by a diagram thus—



Let a current be moving from A to D along a wire (or any other conductor), and at A let it be made to branch off by B and C, the branches meeting again at D, and then

proceeding to complete the circuit. Now as the current passes along, the resistance of the wire (for every conductor offers some resistance) causes the potential of the current to fall; it is therefore less at A than when it started, and is less both at B and C than at A, and less at D than at either. But if the arms of the bridge, A B, A C, be equal to one another in resistance, and also the arm B D to C D (the one pair not necessarily being equal to the other pair), then the potential at B will be just as low as that at C. B and C are connected, and a magnetic needle is placed in the midst. This will not lie in the connecting line unless they are exactly equal; if either is stronger than the other the needle will be deflected. Now let B D, C D, be carefully equalized, and let A B be the part of the circuit to be measured, then by introducing resistance coils into the part of the alternative circuit, A C, we can measure the resistance of A B by varying the strength of our resistance coils until the potential at B is found exactly to balance that at C. If it takes two resistance coils, one of 1000 ohms and one of 100 ohms, placed in A C, to adjust the balance, then A B, the part of the circuit to be measured, has a resistance of 1100 ohms.

BALANCE OF POWER, an expression frequently used in diplomacy during the eighteenth and first half of the nineteenth century, arising from the constant endeavour to prevent any one of the great powers of Europe from acquiring such a preponderance of power as to endanger the independence of any of the others. The notion upon which the phrase was founded might be generally stated as follows:—When a number of separate and sovereign states have grown up beside each other they may be conceived to be evenly balanced, so long as no single state was in a condition to destroy the independence of the rest. But as among such states there were generally a few leading powers, it was by these counterpoising each other that the balance was principally maintained, and the safety of the smaller states secured.

So long as the power of one great state can be kept in check or balanced by that of another the independence of the smaller states will be secured against both, as neither will be disposed to allow its rival to add to its power by conquest. When, however, any one state is allowed to become supremely powerful, the independence of the minor states will be greatly endangered and probably lost. Thus, after the destruction of Carthage there was no power left strong enough to cope with Rome, and the countries that yet remained sovereign powers successively fell under her dominion.

By some historians the idea of a balance of power is regarded as being of modern origin, but combinations among different states, designed to preserve their independence, and to restrain the growing power and influence of any one of their number, will be found to have existed from a remote period. The best known ancient examples are found among the states of Greece.

The conception, however, was perhaps first distinctly avowed and maintained as a political principle at the period when the safety of Europe was endangered by the enormous power and wide ambition of Charles V. Since that period the notion of the necessity of maintaining a proper balance of power has generally been present in the minds of the statesmen of Europe, and it is impossible to form a right estimate of the different policies they have pursued without bearing this in mind. It will be found that this idea has entered in one form or another into most of the great wars, alliances, and treaties that have since that period been made down to the war between the allied powers and Russia in 1854, which was avowedly undertaken to prevent the dreaded aggrandisement of Russia through the dismemberment of Turkey.

Since the conclusion of that war, however, the idea has been given up, and the theory of non-intervention has made

considerable way among the politicians of Europe, and especially so among those of England. Vast changes have occurred since that period, and the annexation of the provinces of Nice and Savoy to France in 1859, of Schleswig and Holstein to Prussia in 1864, the war between Austria and Prussia in 1866, and that between France and Germany in 1870, have all taken place without any joint action on the part of the other great powers, such as in former times would inevitably have taken place.

It may be doubted whether any political dogma has caused so much unnecessary bloodshed and tyranny. It is now quite exploded; and the words of the great Scotch "Chelsea philosopher" may be fitly quoted as summing up modern views of the matter. Carlyle ("Frederick the Great," vol. iii.) says—"Truly, if each of the Royal Majesties and Serene Highnesses would attend to his own affairs, doing his utmost to better his land and people in earthly and in heavenly respects a little, he would find it infinitely profitable for himself and others. And the Balance of Power would settle in that case as the laws of gravity ordered, which is its one method of settling, after all diplomacy."

BALANCE OF TRADE. The balance of trade is the difference between the aggregate amount of a nation's exports and imports, or the balance of the particular account of the nation's trade with another nation. The balance of trade used to be said to be favourable when the value of the exports exceeded that of the imports, and unfavourable when the value of the imports exceeded that of the exports. In this country this was long believed to be the case, and down to a late period we were annually congratulated by our finance ministers on the excess of the exports over the imports.

The attainment of a favourable balance was thus formerly regarded as an object of the greatest importance. The precious metals, in consequence of their being used as money, were long considered as the only real wealth that could be possessed either by individuals or nations; and as countries without mines could not obtain supplies of these metals except in exchange for exported products, it was concluded that, if the value of the commodities exported exceeded that of those imported, the balance would have to be paid by the importation of an equivalent amount of the precious metals; and conversely. A very large proportion of the restraints imposed on the freedom of commerce during the last three centuries grew out of this notion. The importance of having a favourable balance being universally admitted, every effort was made to attain it; and nothing seemed so effectual for this purpose as the devising of schemes to facilitate exportation, and to hinder the importation of almost all products, except gold and silver, that were not intended for future exportation. But it is now conceded on all hands that gold and silver are nothing but commodities, and that it is in no respect necessary to interfere either to encourage their importation or to prevent their exportation. In Great Britain they may be freely exported and imported, whether in the shape of coin or bullion.

The theory of the balance of trade proceeded also on radically mistaken views as to the nature of commerce. The proper business of the wholesale merchant consists in carrying the various products of the different countries of the world from the places where their value is least to those where it is greatest, or, which is the same thing, in distributing them according to the effective demand. It is clear, however, that there could be no motive to export any species of produce, unless that which it was intended to import in its stead were of greater value. When an English merchant commissions a quantity of American wheat, he calculates on its selling in England for so much more than its price in America as will be sufficient to pay the expense of freight, insurance, &c., and to yield besides the common

and ordinary rate of profit on the capital employed. If the wheat did not sell for this much its importation would obviously be a loss to the importer. It is plain, then, that no merchant ever did or ever will export, but in the view of importing something more valuable in return. And so far from an excess of exports over imports being any criterion of an advantageous commerce it is directly the reverse; and the truth is, notwithstanding all that has been said and written to the contrary, that unless the value of the imports exceeded that of the exports (in the United Kingdom the excess is between £100,000,000 and £114,000,000 annually) foreign trade could not be carried on, for merchants would lose on every transaction.

In the second place, when a balance is due by one country to another, it is but seldom that it is paid by remitting bullion from the debtor to the creditor country. If the sum due by the British merchants to those of Holland be greater than the sum due by the latter to them, the balance of payments will be against Britain; but this balance will not, and indeed cannot, be discharged by an exportation of bullion, unless bullion be at the time the cheapest exportable commodity; or, which is the same thing, unless it may be more advantageously exported than anything else. To illustrate this principle, let us suppose that the balance of debt, or the excess of the value of the bills drawn by the merchants of Amsterdam on London over those drawn by the merchants of London on Amsterdam amounts to £100,000, it is the business of the London merchants to find out the means of discharging this debt with the least expense; and it is plain that if they find that any less sum, as £96,000, £97,000, or £99,900, will purchase and send to Holland as much cloth, cotton, hardware, colonial produce, or any other commodity as will sell in Amsterdam for £100,000, no gold or silver will be exported. The merchant who deals in the precious metals is as much under the influence of self-interest as he who deals in coffee or indigo; and what merchant would attempt to extinguish a debt by exporting coffee which cost £100, if he could effect his object by sending abroad indigo which cost only £99?

Not only, therefore, is the old theory with respect to the balance of trade erroneous, but the very reverse of that theory is true, although it is still maintained by some persons. In the first place, the value of the commodities imported by every country which carries on an advantageous commerce (and no other will be prosecuted for any considerable period) invariably exceeds the value of those which she exports; and in the second place, whether the balance of debt be for or against a country, that balance will neither be paid nor received in bullion, unless it be at the time the commodity by the exportation or importation of which the account may be most profitably settled.

The official statistics annually published by the nations of Europe, British colonies, and the United States of America, are quite inadequate of themselves to show the gain or loss of wealth by each community, as of necessity many of the most important factors in the question are left out. Thus, by way of illustration, the value of the exports from the United States in 1882 exceeded that of the imports by over £50,000,000. According to the ideas which formerly prevailed, the people of the United States would have been regarded as being the gainers to that extent, and the matter would have been cause for lamentation on the part of those countries with whom her trade was conducted. As an actual fact, however, this large excess of exports reveals a state of things rather the reverse of prosperous than otherwise. The value of the exports is calculated at their price in America; but as by far the largest part of the carrying trade of the United States is done by means of the vessels of other nations, a larger amount must be exported in order to cover the cost of freight paid to the foreign shipowners. As most of the exports from the

United States are goods of a bulky character, wheat, cotton, tobacco, meat, &c., the cost of carriage forms a considerable item in the amount to be paid by the exporters. Then it must be remembered that the United States is largely indebted to Europe, and heavy remittances must be made in order to pay the interest due on the government, state, municipal, and railway bonds, railway shares, &c. There are also a large number of Americans to be found every year travelling in Europe, a number far in excess of the Europeans travelling in America, for whose expenses remittances must also be sent to Europe. It has already been shown that remittances are more generally made in goods than money; and it thus becomes evident that excess of exports rather shows the indebtedness of the United States to Europe than the prosperous condition of its economic state. In estimating the economic condition of any country many facts must be taken into consideration; the balance of trade is one of these, but it is only one among many.

It is difficult to estimate the mischief which the absurd notions relative to the balance of trade have occasioned in almost every commercial country. The great, or rather the only, argument insisted upon by those who prevailed on the legislature, in the reign of William and Mary, to declare the trade with France a nuisance, was founded on the statement that the value of the imports from that kingdom considerably exceeded the value of the commodities we exported to it. The balance was regarded as a tribute paid by England to France; and it was sagaciously asked, What had we done that we should be obliged to pay so much money to our natural enemy? It never occurred to those who so loudly abused the French trade, that no merchant would import any commodity from France unless it brought a higher price in this country than the commodity exported to pay it, and that the profit of the merchant, or the national gain, would be in exact proportion to this excess of price.

BALANINUS is a genus of beetles belonging to the Curculionidæ, a family of the BRUCHOPHORA. The species are all remarkable in possessing a long slender rostrum, or snout, which is furnished at the tip with a minute pair of sharp horizontal jaws; this instrument is used by the animal in depositing its eggs, which are generally placed in the kernel of some fruit.

Balaninus nucum, or the nut-weevil, deposits its eggs in both the common nut and the filbert, having bored a hole for that purpose while the nut is young and tender.

Balaninus glandium, another species of the same genus, attacks the acorn in the same manner as the one above-mentioned does the nut.

BALANOPHOREÆ is an order of parasitical plants growing in tropical countries upon the roots of woody plants, from which they draw their nutriment. They have no leaves, and bear some resemblance to fungi; but there is no actual relationship, as flowers are present. They are natives principally of tropical countries, one species being found as far north as the southern shores of the Mediterranean, *Cynomorium coccineum*. This species, known to the Crusaders as *Fungus melitensis*, grows in Malta, North Africa, and Canaries. It was at one time so highly valued for dysentery that the English government used to appoint an official in Malta to protect its growth. The order is characterized by its scaly flower stalks; flowers in spikes, unisexual; styles one or two; ovules solitary, pendulous. The "mountain maize" of the Peruvians is *Ombrophytum*; after rain it springs up very rapidly; the stalks are cooked and eaten like mushrooms.

BALANUS or **ACORN-SHELL**, a genus of shelled marine animals belonging to the class CIRRIPEdia, in which the barnacles are included. Instead of hanging by a fleshy stalk, as do the barnacles (Lepas), the animals of this genus are attached by the shell itself. The immature

form of the balanus is scarcely distinguishable in all its stages from that of the BARNACLE, under which the development of a cirripede is described. The adult balanus having passed through the several stages necessary for its full development, attaches itself by its antennæ to a foreign body, and secretes a shell. The shell is composed of calcareous plates, generally six in number, which form together an irregular cone; the aperture at the top is closed by a movable lid (*operculum*). The aperture at the other end of the shell is closed by the "basis," a shelly plate to the centre of which the head of the animal is fixed, and which is immovably cemented to some rock or foreign body. Through a slit in this shell the balanus protrudes six pairs of long curling feet or "cirri," which are alternately pushed out and retracted, thus keeping up a constant current of water, and sucking in, as in a whirlpool, the minute creatures on which it feeds.

The pedunculated cirripedes, of which the barnacle is the type, have minute folds of skin inside the sac that covers the body, called by Darwin "ovigerous frena," which serve to retain the eggs till hatched. In the balanus these are absent, but large folded branchiæ (gills) are present. "I do not doubt," says Darwin in his "Origin of Species," "that little folds of skin, which originally served as ovigerous frena, but which likewise very slightly aided the act of respiration, have been gradually converted, by natural selection, into branchiæ, simply through an increase in their size and the obliteration of their adhesive glands. If all pedunculated cirripedes had become extinct, and they have already suffered far more extinction than have sessile cirripedes, who would ever have imagined that the branchiæ in this latter family had originally existed as organs for preventing the ova from being washed out of the sac?" All the members of the genus are hermaphrodite. The species are numerous and most widely diffused, taking possession of rocks, ships, timber floating or at rest, shells



Balanus tintinnabulum.

of crustacea and mollusca, &c. Some of them are of considerable size, and one species of the genus Balanus (*Balanus psittacus*) found on the coast of Chili, growing to the size of 5 or 6 inches, forms a very common and highly esteemed food for the natives, who call it *pico*. The flesh is said to equal in richness and delicacy that of the crab. Another species, *Balanus tintinnabulum*, is equally prized by the Chinese, the flesh of which is said to resemble the lobster. Some of the species, as in *Acantha*, are found attached to sponges, while others, as in *Ptyrgoma*, are embedded in corals.

BALAPUR, a town of British India, in the Akola district, Berar, six miles south of Paras station on the Great Indian Peninsula Railway. The population is 13,000, a large number of whom are Mohammedans.

BALASOR, a district in Orissa, British India, lying

between 20° 43' and 21° 56' N. lat., and between 86° 18' and 87° 31' E. lon. The area is 2068 square miles, and the population 780,000. It is bounded on the north by Midnapur district and the tributary state of Morbhanj; on the east by the Bay of Bengal; on the south by Cuttack district—the Baitarani river forming the boundary line; and on the west by the tributary states of Keunjhar, Nilgiri, and Morbhanj.

The district consists of a strip of alluvial land, lying between the hills which rise from the western boundary, and the sea on the east. This varies in breadth from about 9 to 84 miles, and is divided into three well-defined tracts—the salt tract, nearest the coast; the arable tract, which constitutes the largest part of the district; and the submontane or jungle tract. The salt tract extends along the coast, forming a desolate sandy strip some miles broad, traversed by sluggish streams of brackish water, and clothed here and there with such scrubby vegetation as the arid soil will support. The arable tract, which adjoins this sandy strip, is a long dead level of rice-fields; the soil is lighter in colour and more friable than that of Bengal generally. The submontane tract is undulating, with a red soil, and is broken up into ravines along the base of the hills. Balasor is watered by five principal rivers—the Subarnarekha ("Struck of Gold"), the Panchpara, the Burabalang ("Old Twister"), the Kansbans, and the Baitarani (the Styx of Hindu mythology).

Rice is the staple crop in Balasor, as throughout the rest of Orissa; indeed, it may almost be called the only crop of the district, as it has been estimated that but one acre in a thousand of the cultivated area is sown with anything else. The principal manufacture of the district, and indeed the only one worthy of notice, is salt. The process is very simple and rude, consisting merely of evaporation in the roughest way. The manufacture is carried on in the saline tract adjoining the coast. The principal trade is carried on with Calcutta.

BALASOR, a municipal town, port, and the administrative headquarters of the above district, is situated on the right bank of the Burabalang river. Among the articles of import are metals (used for the manufacture of domestic utensils and ornaments), piece-goods, cotton, twist, tobacco, gunny-bags, drugs, oil, sugar, seeds, &c. The chief export is rice. The population is 20,000.

Balasor was acquired with the rest of Orissa in 1803, but the interest of the British in the district dates from a much earlier period. In fact, Balasor town was one of the first English settlements in Eastern India. The story of its acquisition is romantic. In 1636 Mr. Gabriel Broughton, surgeon of the ship *Hopewell*, cured the emperor's daughter, whose clothes had caught fire, and in 1640 he successfully treated one of the ladies of the Bengal viceroy's zenana. When asked to name his own reward, he replied that he wished nothing for himself, but begged that his countrymen might be allowed a maritime settlement in Bengal. Accordingly, in 1642, imperial commissions were made out granting the East India Company a land factory at Hoogly, and a maritime settlement at Balasor. The latter place was at once fortified, and became in reality the key to the position which England has since gained in India. During the long struggle between the Afghans and the Mughals, and subsequently between the Mughals and the Marhattas for supremacy in Orissa, the English steadily kept the footing they had obtained. Defended on one side by the river, and on all others by a precipitous channel, which had been deepened so as to form a moat, and further protected by the guns on its ramparts and the armed merchantmen in the roads, Balasor was safe from attack.

BALATON, LAKE, or the *Platten See*, a salt lake in the south-west of Hungary. Its length from S.W. to N.E. is about 46 miles; in breadth it is extremely irregular, but the average is about 7 miles. It is thus the largest lake in

south-east Europe. It lies between 46° 45' and 47° 5' N. lat., 17° 14' and 18° 10' E. lon. The depth of this lake is very variable, but in general it ranges from 27 to 36 feet. It occupies a surface of about 110 square miles, to which may be added an extent of about 88,170 acres of swamps and marshes, which its inundations render unfit for cultivation. It is supplied with fresh water by the Szala, which flows into it at its southern extremity, as well as by nine springs which rise on its margin, and thirty-one rivulets and brooks, independently of whatever quantities it receives from the sources which ascend from its bed. The outlet of the lake is through the Sio, near the town of Fok. Its northern sides are encircled by hills covered with woods and vineyards. The surrounding country is full of limestone, intermixed with red and yellow clay. The waters are beautifully clear and transparent, excepting when they become boisterous or a storm is at hand, and then they assume a sombre bluish hue. The lake abounds in fish. There is a spring near Fured, on the banks of the lake, which is impregnated with carbonic acid, and is beneficial in female complaints. The place is much frequented by the Hungarian nobles from May to September. The railway from Trieste to Ofen skirts the S. bank of the lake.

BALBEC. See BALBEC.

BAL'BI, ADRIANO, a celebrated geographer, born at Venice 25th April, 1782. He was appointed professor of geography at Murano in 1808, and professor of physics at Fermo in 1811. He married an actress in 1820, and the same year journeyed with her to Portugal. In 1822 he published in Paris a work entitled "Essai Statistique sur le Royaume de Portugal et d'Algarve," and the same year another work entitled "Variétés Politiques et Statistiques de la Monarchie Portugaise." He removed to Paris to superintend the publication of these works, and continued to reside there until 1832. Here he published, in 1826, the first volume of his "Atlas Ethnographique du Globe, ou Classification des Peuples anciens et modernes d'après leurs Langues." This was a work of great value, Balbi being one of the first to take advantage of the results of modern travel and the researches of philologists. In 1832 he published his celebrated "Abrégé de Géographie," which has been translated into the principal languages of Europe. He received a grant from the French government, and returned to Italy, taking up his residence at Padua. He died at Venice, 14th March, 1848, and a collection of his works was published by his son, Eugenio Balbi (five vols. Turin, 1841-42).

BAL'BI, GAS'PARO, a Venetian merchant and traveller, who lived in the second part of the sixteenth century. He was a dealer in precious stones, and the business of his trade led him to Aleppo, whence he undertook a journey to India, and as far as Pegu, which lasted several years. On his return to Venice he published an account of this journey, "*Viaggio all' Indie Orientali*" (8vo, Venice, 1590). Those Venetian merchants who ventured so far appear to have been on good terms with the Portuguese traders, then almost the only Europeans in India, and to have enjoyed security under their protection. Balbi wrote in an unpretending style, which bears marks of his candour, as to what he himself saw, and also of his credulity with regard to matters which he knew only from hearsay. He is very minute and exact in every particular of mercantile information, but his statements are scanty with regard to the history and geography of the countries visited.

BALBINUS, DECIMUS CAELIUS, a Roman senator, after being twice consul, was elected emperor by the senate in opposition to their enemy, the usurper Maximin, who was supported by the legions in Germany.

The two Gordians, father and son, who had been proclaimed emperors shortly before in Africa with the approbation of the senate, were killed by the soldiers of Capellianus, the governor of Mauritania, an adherent of Maximin. [See

GORDIAN.] Maximin, hearing that the senate had outlawed him, was preparing to march from Illyricum into Italy. The senate in this emergency elected two emperors—Clodius Pupienus Maximus, an experienced officer, who had risen from a low station to the highest ranks, and Balbinus, a man of station and fortune, "an admired orator, a poet of distinguished fame, and a wise magistrate, who had exercised with innocence and applause the civil jurisdiction in almost all the interior provinces of the empire" (Gibbon). As the two emperors elect were proceeding to the Capitol to sacrifice to the gods, the people and the soldiers stopped the way, demanding an emperor from the family of the Gordians, who were popular favourites. A boy twelve years of age, the son of a daughter of the elder Gordian, being found, was saluted Cæsar, by the name of Marcus Antonius Gordianus, afterwards known in history as the Third Gordian. After the tumult was thus appeased, and the customary games in the Circus were given for the amusement of the Roman people, Maximus set off for North Italy to oppose Maximin, while Balbinus remained at Rome. A serious tumult broke out in the city, which Balbinus was long unable to suppress. Maximin was killed by his own soldiers, who afterwards made their submission to Maximus. Maximus then returned to Rome to enjoy a triumph for having ended the civil war, A.D. 241. The people of Rome were overwhelmed with joy, but the soldiers were dissatisfied, seeing their influence on the decline. A misunderstanding also appears at the same time to have existed between the two emperors. While most of the citizens had gone to witness the celebration of the Capitoline games, the prætorian soldiers sallied out to attack the palace of the emperors. Maximus, being informed of this, sent for his German guards, in whom he trusted; but Balbinus, through some suspicion of the designs of Maximus, opposed the order. The prætorians had thus time to force the entrance of the palace, when, rushing into the apartments, they seized both emperors, whom they dragged ignominiously towards their camp. Hearing that the Germans were coming at last, they killed their two prisoners, and left the bodies in the street. They then took the boy Gordian to their camp and proclaimed him emperor, and he was acknowledged by the people and the senate, A.D. 242. Balbinus and Maximus reigned little more than one year, during which time they had shown assiduity in their duties, attention to justice and public security, and respect for the laws. Maximus was renowned for firmness, tempered by moderation; and Balbinus for his affability and his elegant manners, his love of luxury and refinement within due bounds. His house, inhabited by his posterity, was still existing in the time of Diocletian (Julius Capitolinus, "Historia Augusta"). The reign of these two emperors is a sample of the social and political condition of Rome in the century which elapsed between the death of Commodus and the accession of Diocletian; thirty emperors, besides pretenders, followed each other in rapid succession, and only two of them died a natural death.

BALBO, CESARE, an Italian statesman and author, was born at Turin, 4th November, 1789. At the age of eighteen he was nominated auditor of the council of state by Napoleon I., and went to Paris in that capacity. He afterwards entered the army, and served in the campaign of Grenoble. On the fall of Napoleon he returned to Italy and commenced his literary and political career. He is chiefly remarkable from the fact that his first important work, "*Le Speranze d'Italia*," published in 1844, may be regarded as having given the programme of the "*Moderates*" of Italy, and helped to create the monarchical Piedmontese party as opposed to the republican party led by Joseph Mazzini. Balbo also wrote a summary of Italian history, a translation of Tacitus, a life of Dante, and other less important works. Though a liberal he was a firm

supporter of the Roman Catholic Church. He was active in the stormy times of 1847 and 1848; and was one of the chief supports of the D'Azeglio ministry. He died on the 3rd of June, 1853.

BALBOA, VASCO NUNEZ DE, was born in Xerez de los Caballeros, in Spanish Estremadura, about 1475. Vasco in his youth held some office in the house of Don Pedro Portocarrero, lord of Huelva; and in 1501 he accompanied Rodrigo de Bastidas in his voyage of discovery to the coast of Cumana. He revisited Spain, but in 1510 he was at Salvatierra, one of the settlements in St. Domingo, or Española, as it was then called. Here he joined Bachiller Enciso, who was taking out a reinforcement to the expedition of Alonso de Ojeda and Diego de Nicuesa, who had obtained a grant of the country on the Gulf of Darien. They formed a small settlement at San Sebastian. The leaders quarrelled; Ojeda died; Nicuesa was sent as a prisoner to Spain, but was lost at sea during his passage; Enciso was superseded by Balboa, imprisoned, and only released on condition of leaving Darien. Throughout the expedition Balboa had distinguished himself by his courage and conduct, and having now acquired the supreme command, and also received the first information of Peru, applied for and obtained some assistance from Columbus. He then, in the beginning of September, 1513, embarked his men in one brig and some canoes, and sailed direct from Darien to Coiba, an island near the coast of Veragua, where he left the vessels, and proceeded into the interior. By his prudent policy he won several tribes of Indians, and after a painful journey of about a month he arrived, on the 29th of September, at a mountain, from the summit of which the immense expanse of the Pacific Ocean burst upon his view. Affected at the sight, and falling upon his knees, he thanked the Almighty for having granted him the favour of discovering these immense regions. He then cut down a large tree, and, depriving it of its branches, erected a cross upon a heap of stones, and wrote the names of Fernando and Isabel on the trunks of several trees round about. Descending with his companions to the sea-shore, Balboa, in full armour, having in one hand his sword and the standard of Castile in the other, stood upon the sand until, the tide ascending, the water reached his knees. He then said in a loud voice, "Long live the high and powerful king and queen of Castile. In their names I take possession of these seas and regions; and if any other prince, either Christian or pagan, should pretend to have any claim or right to them, I am ready to oppose him, and to defend the right of their lawful possessors." A notary then registered this act, by which the Spaniards considered themselves to be the lawful possessors of all that country. To that part of the sea they gave the name of Golfo de San Miguel, on account of its having been discovered on Michaelmas Day. Balboa, after visiting some of the islands in the gulf, returned to Darien. The fatigues of the journey brought upon Balboa a very dangerous fever, which obliged him to be carried part of the way in a hammock to the settlement, where he arrived on the 19th of January, 1514. On arriving at Darien, Balboa gave those who had remained in the colony their proportionate share of the riches acquired in the expedition; he also sent a messenger to Spain to give an account of his discovery, and devoted himself entirely to the improvement of the settlement. By intrigues at home, however, he was superseded in his government by Pedrarias Dávila, who arrived at Darien in 1514. In 1515, however, he was appointed governor of Darien and Coiba under Pedrarias, but a dispute having arisen he was accused of treason, tried, and executed in 1517.

BALBRIGGAN is a small town and seaport of Ireland, in the county of Dublin, 22 miles N. from Dublin city. It is a station on the Dublin and Drogheda Railway. Cotton stockings are manufactured, and the embroidering of muslin is carried on to a considerable extent in the town and

neighbourhood. A handsome church and a large Roman Catholic chapel are both of modern erection. The port has a little coasting trade, and in summer is frequented as a bathing-place. There is a pier 600 feet in length, with a lighthouse at its extremity. Balbriggan was the scene of a sanguinary battle in 1829, between the first Earl of Louth and some of the English settlers, who disputed the claim to the palatine dignity of the county, but were defeated. William III. encamped here on his march to Dublin, after the battle of the Boyne. The population in 1881 was 2443.

BAL'BUS ("the stammerer"), a common family name or *cognomen* in several *gentes* of ancient Rome, due, of course, to some ancestor of the family in question having suffered from this personal defect. Thus we have a remarkable M. Aclius Balbus, as in early English we should have an Eadward Stutter; and this particular Manlius of the great Aclian clan (*gens*), or this particular Eadward, was at once marked off in this way from his namesakes. There was also a T. Aupius Balbus, and again an M. Atius Balbus, a Lucilius Balbus, an Octavius Balbus, &c., each "stammerer" being of a clan as separate from the rest as any Campbell from Macdonald. But by far the most famous family which bore this oddly common cognomen was that belonging to the illustrious clan Cornelius (*Cornelia gens*), and of this the best known is Lucius Cornelius Balbus, a citizen of Gades in Spain, the modern Cadiz. He served so well under Pompey the Great against the rebellious Sertorius that Pompey rewarded him with the freedom of "the city," and took him to Rome on his triumphal return, B.C. 71. Here he was fortunate enough also to gain and retain the esteem of the great Julius Cæsar. His favour with the two foremost men of the world brought him into the fierce light of envy; and another famous friend, no less than Cicero himself, had to defend the life and fame of Balbus from serious charges at the hands of demagogues. The oration, a very noble one, was quite successful, and has fortunately been preserved. In the civil war Balbus would strike no blow against his first friend Pompey, but he accepted the management of all Cæsar's affairs during the frequent absences of the great dictator, and thus rendered him perhaps better service than in the field. Cæsar dedicated the eighth book of his celebrated "Commentaries" (on his own campaigns) to Balbus. After Cæsar's murder and the rise to power of his great-nephew and heir, Octavian, the proved skill and integrity of Balbus endeared him to the new master of the world, and he served a consulship in B.C. 40.

He must not be confused with his namesake and nephew, who served under Cæsar, added a suburb to Gades, was afterwards præconsul of Africa, and built one of the most magnificent theatres at Rome. This last was dedicated B.C. 13, and held 11,600 spectators; it stood on the site of the modern Palazzo Cenci. Though his career was more splendid than his uncle's he never had the same remarkable influence in the state.

BAL'CONY, a platform or gallery outside the window of a room (Italian, *balcone*; Old German, *balko*, a beam; old-fashioned English, *balk*, as "a balk of timber"). The balcony is much employed in edifices of modern date. The object of balconies is to give the inhabitants of a house a better view. They are formed nearly on a level with the floors of rooms, and supported on cantilevers or brackets, and sometimes, though more rarely, on columns of wood or stone. The floor of the balcony is laid on the cantilevers, and the sides are inclosed with a rail of iron, or a balustrade of stone. In Venice there are very magnificent Gothic balconies, remarkable for their richness. It is uncertain when balconies were first introduced into England. Some of the old inns, with the galleries round them, are perhaps the oldest examples existing.

BAL'DACHIN (Italian, *baldachino*), a kind of canopy, either supported on columns, or suspended from and used

to cover an altar in a Roman Catholic church. The Italian word signifies a piece of furniture, which is carried or fixed over sacred things, or over the seats of princes and persons of great distinction, as a mark of honour. The form, for the most part, is square, and the top covered with cloth with a hanging fringe; sometimes the fringe is formed of pieces of cloth cut out after the fashion of a banner. The baldachin has been supposed to have been derived from the ancient *ciborium* (*kiborion*, a large cup or vase). An isolated building, placed by the early Christians over tombs and altars, was called a ciborium. The modern baldachin is of the same form as the ciborium erected by Justinian in the Church of Santa Sophia of Constantinople, which was made of silver, gold, and precious stones, and supported by four silver-gilt columns. The baldachin in St. Peter's at Rome, made by Bernini, is the most celebrated, and is the largest known work of the kind in bronze—being 95 feet in height, and weighing 93 tons. It is not improbable that the Gothic canopies over figures of saints were intended for baldachins.

BALD BUZZARD. See OSPREY.

BALD'NESS (or *Alopecia*, as it is technically called) is the loss of hair, which may be partial or general, temporary or permanent. A very rare form is that in which children are born bald, and the growth of hair is retarded for one or two years, or never takes place. This is termed congenital baldness, and is not amenable to treatment. Accidental baldness may arise from several causes, such as the presence of a skin disease, debility caused by an exhausting illness, or as a result of syphilis. The most common form is that of senile baldness or calvities, one of the consequences of old age. In this the hairs first become gray and then white in colour; they become dry and crisp and split at the ends, and at last the white hairs are shed without others being formed, and baldness appears. It generally begins and is frequently limited to the crown of the head, and it arises from a shrinking of the tissues of the scalp and the consequent obliteration of the hair follicles on which the hairs depend for nutrition. It is more common among men than women, and with some individuals it arises comparatively early in life, either from an hereditary peculiarity, from weakness in general health, or from the wearing of non-porous head coverings, which, by preventing evaporation from the head, brings about an unhealthy state of the skin. Where thinning of the hair arises from constitutional debility attention must be paid to the general health, and when this is restored the falling off will be stopped as a rule, and a fresh growth of hair will take place. This may be assisted by local stimulants applied by means of a pomade or hair wash, though such remedies should be always used with caution, and should not be unduly exciting in their action. Most of the preparations so largely advertised for promoting the growth of the hair owe their efficacy (where they possess any) to the presence of cantharides. This acts by irritating the skin of the scalp, and by inducing a determination of blood to the part may aid in the nutrition and growth of the hair. A simple method of using this drug consists of the admixture of two drachms of the ointment of cantharides with two ounces of lard or pomatum, while another preparation of some repute consists of equal parts of glycerine and sal volatile. These should be rubbed into the scalp at the roots of the hairs. Other means may also be adopted, such as pouring cold water over the head night and morning, and then rubbing the scalp dry with a rough towel, the use of a hard brush, cutting the hair short, or in the case of females cutting the ends of the hair at regular intervals, while in some cases shaving a portion of the scalp, or even the whole head, may be found to be of advantage. Baldness arising from old age is not amenable either to local or general treatment, and where the hair follicles have become absorbed or destroyed is quite incurable.

BALDOCK, a town in Hertfordshire, 37 miles from London by the Great Northern Railway. The town is said to have been built by the Knights Templars before the time of Henry III. The church is a large and handsome Gothic edifice. It was restored at great cost, and some new stained-glass windows inserted, in 1868. A considerable trade is carried on in malt; there is also manufactures of straw-plait, and some breweries. Population, 2326.

BAL'DRIC or **BAU'DRICK** (Fr. *baudrier*), a military belt, band, or girdle much used by warriors in more ancient as well as in the feudal times, ordinarily encircling the waist, but occasionally pendent from the right shoulder and sustaining a sword, or sometimes a shield or quiver. The baldric was often ornamented with precious stones.

BAL'DUR or **BALDE** ("the beautiful"), the brilliant and beloved Ase (god) of light in the Norse mythology, surrounded with perpetual radiance, dwelt in bright Breidablick, his palace in ASGAR, and nothing impure, evil, or unjust came ever near that holy house. The camomile flower was called Baldur's eyebrow, because of its dazzling purity. His wife was Nanna, daughter of Nep, who to modern eyes seems to typify Blossom, daughter of the Bud, meet bride for the Sunlight. Amongst the myths of Baldur the most striking is that of his death, which had been foretold in dire prophecies, filling the Ases with terror. While All-father Odin, his father, went to gather more distinct information from prophetesses and wise people, Frigga, Baldur's mother, journeyed through all creation, and bound gods, elves, men, beasts, and even trees and stones not to hurt the darling of the gods. The divine Ases now rejoiced, trying Baldur with lances and sharp sword cuts, all of which passed him by harmless, for had not the wood and iron sworn? An old woman described the scene to Frigga merrily, and asked if even grass and flowers were bound with the oath. Then Frigga answered that even they were; in fact she had passed over nothing save the mistletoe on the oak at the gate of Wal-halla, so soft and weak a thing that it was hardly worth while to rectify the omission. The pretended old woman, who was Loki, the god of mischief, hurried to this mistletoe, and strengthened its stem by magic arts till a spear-shaft could be made of it. Rejoining the circle of the games, Loki suggested to Hödur, the blind brother of Baldur, that he also should throw a spear. The blind god threw the fatal shaft, which Loki sped on its way, and Baldur fell dead. The Ases turned in horror and rage on Hödur, who felt for his tempter; Loki had fled. They would have killed him also had not Odin just then returned, able now, after hearing the prophecies in full, to pronounce all these evils the working of fate. Hödur was allowed therefore to go into exile, while Hermodur sought the realms of the shades, and Queen Hel's dominion, to endeavour to bring back his beloved brother Baldur. Hel was willing enough to let him go if all the world desired it. Joyful at the news the Ases sent servants into all parts of the universe to call upon all things to weep for Baldur, till the tears hung like pearls from every tree and lay on every stone. Only the giantess Thökk refused to weep for Baldur, and one of the Ases thought that Loki's eyes glittered under the folds of her hood. Thus was the spell made incomplete. A miraculous child of Odin came in due time, grew in one day to man's stature, and as his first exploit despatched the fratricide Hödur with his arrows, as the prophetesses had foretold.

There is no doubt but that this myth personifies spring avenging the death-sleep during the long winter of the joyous light; with his arrowy sunbeams he kills the dark blind winter. The weeping showers of autumn, and the faithless mistletoe fruiting out of due time, in mid-winter, form striking features in the myth.

BALDWIN was the name of several Counts of Flanders, whose reigns were distinguished by little except the

share they took in the almost constant wars prevailing during their era in Europe, sometimes as allies of the more powerful neighbouring sovereigns, and sometimes in defence of their own territories; but of which the details are of little interest and of no general importance. We shall therefore give little more than a list, but sufficient to identify them.

BALDWIN or **BAUDOUIN**, great forester of Flanders, succeeded, A.D. 837, his father Andacer in the government of that province, as feudatory of the Emperor Louis, Charlemagne's successor. After the death of Louis, in 840, he endeavoured to make himself independent of the three sons and successors of Louis, Lothair, Charles the Bald, and Louis of Bavaria; and having married, against the consent of her father, Judith, the daughter of Charles the Bald, he was excommunicated by Pope Nicholas I. He at length not only obtained absolution, but, by the intervention of the pope, the forgiveness of his father-in-law; and his territories were enlarged and erected into a county. He died at Arras in 877.

BALDWIN II., Count of Flanders, son of the foregoing, married Alfrith, daughter of Alfred of England. He died in 919, and was succeeded by his son Arnoul.

BALDWIN IV. succeeded his father Baldwin III. in 1034. He gave his daughter Matilda to William the Conqueror, whom he accompanied to England. For his services on that occasion William assigned him and his successors a yearly pension of 300 marks of silver out of the English treasury. Baldwin died in 1067, and was buried at Lisle.

BALDWIN VII. made war in Normandy in favour of William, son of Robert Curthose, against Henry I. of England, and, being severely wounded at the siege of Rouen, died soon after in 1119.

BALDWIN I., King of Jerusalem, was the son of Eustace, count of Bouillon, a feudal territory in the Ardennes, and of Ida of Lorraine. He accompanied his two elder brothers, Godfrey, duke of Lower Lorraine or Brabant, and Eustace, count of Boulogne, to the first crusade in 1096. [See CRUSADES.] Baldwin distinguished himself throughout the war, and after his brother Godfrey had been elected king of Jerusalem, he repaired to the Holy City. In the following year, 1100, Godfrey died, and Baldwin, being called to succeed him, was crowned on Christmas Day 1100. His reign, which lasted till 1118, was one of continual warfare against the Turks, the Arabs, the Persians, and the Saracens of Egypt, in which Baldwin displayed much bravery and perseverance, indefatigable activity, and with general success. While conducting an expedition against Egypt, he was taken ill, and died in March, 1118. Baldwin was a very different character from his brother Godfrey, who was a sincere enthusiast, pure and disinterested. Baldwin was ambitious and worldly, but at the same time brave, clever, and firm.

BALDWIN II. succeeded his cousin Baldwin I. on the throne of Jerusalem. Under his reign the military and religious order of the Templars was instituted for the defence of the Holy Land. [See TEMPLARS.] The order of St. John of Jerusalem had been instituted many years before for pious and charitable purposes; but it also now assumed a military character. Baldwin's reign, like that of his predecessor, was one of almost constant warfare against the Turks, Arabs, and Egyptian Saracens. Baldwin abdicated the crown in favour of his son-in-law, Fulk of Anjou, in 1131, and retired to the monastery of the Holy Sepulchre, where he soon after died.

BALDWIN III., the chivalrous and honourable son of Fulk of Anjou, succeeded his father in 1142. Baldwin had to struggle, during the greater part of his reign, with the power and abilities of Noureddin, the Fatimide sultan of Egypt, whose ally he became after having thoroughly proved his superiority. So great were the

fame and esteem his noble character procured him that Saracens willingly served with him under the Christian flag after he had become friendly with Nouredin. [See NOUREDDIN.] Louis VII. of France, and Conrad III., emperor of Germany, undertook the second crusade in 1147, at the exhortation of St. Bernard, for the object of supporting their Christian brethren of Palestine. Their expedition turned out unfortunate. Baldwin died in February, 1162. He was succeeded by his brother Amaury, or Amalric.

BALDWIN IV., son of Amaury, was still a minor when his father died in 1174, afflicted with leprosy and nearly blind. In this distressed state he had to encounter the might of Saladin, who had succeeded Nouredin, and had extended his power over both Egypt and Syria. Baldwin, however, obtained a truce from Saladin. He died in 1186, leaving for his successor his nephew, Baldwin, then a child, who died seven months after his uncle, and Jerusalem was taken by Saladin in 1187. See SALADIN.

BALDWIN I., the first Latin Emperor of Constantinople, was the son of Baldwin VIII., count of Flanders. Baldwin IX. of Flanders, in 1200, resolved to join the fourth crusade, which was formed in consequence of the exhortations of Pope Innocent III., for the purpose of reconquering Palestine, and with his brother Henry, and a numerous body of knights and men-at-arms, proceeded through Burgundy and Italy to Venice, which was the appointed place of meeting. The Venetians proposed that, on their way to the East, the crusaders should stop before Zara in Dalmatia, and assist the Venetians in reconquering that place, which had revolted, and given itself up to the king of Hungary. This was at length agreed to, and Zara was taken in 1202. At Zara the crusaders were applied to for their assistance by messengers from the son of Isaac Angelus, the emperor of Constantinople, who had been deposed, had his eyes scared out, and been thrown into a dungeon by his brother Alexius III. After much deliberation, the expedition to Constantinople was resolved upon. Meantime a revolution took place within the city; the usurper Alexius escaped in a boat with his treasures, and Isaac was restored to the throne, but a quarrel arose immediately, and this was the signal for a new revolution in the city. The old Emperor Isaac died of terror and grief.

The crusaders now invested Constantinople, and at the end of nearly three months' siege a general assault was made. The Greeks sued for mercy, and the carnage was stopped; but the city was given up to plunder, attended by all its concomitant excesses, although both Baldwin and the Marquis of Montferrat exerted themselves to restrain the licentiousness of the soldiers. The total share in money and valuables seized by the French was 400,000 marks, seven times the annual revenue of England at that time; and the Venetian share was greater, since the ships, &c., had to be paid for. A new emperor was to be appointed by the conquerors, and the choice fell upon Baldwin of Flanders, the most distinguished as well as the most powerful of the crusaders. The authority of Baldwin, however, was much circumscribed: not more than one-fourth part of the provinces of the empire was appropriated to him, one-half of the remainder being allotted to the Venetians, whose doge was proclaimed Despot of Roumania; the other half was distributed among the adventurers of France and Lombardy. The Marquis of Montferrat had for his share the kingdom of Thessalonica and the island of Crete, which last he sold to the Venetians. Others received fiefs in various parts of the empire. Several provinces, however, remained in the possession of Greek princes, the relatives of the former emperors. Baldwin was therefore rather a titular than a real emperor, and all his abilities and good intentions, for which historians have generally given him credit, could not prevent the disorders inherent to such a state of things. Intrigue and insur-

rection raged on all sides; and at length, in a contest with the Bulgarians, he was defeated and taken prisoner on the 15th of April, 1205, and died a prisoner the following year.

BALDWIN II., Emperor of Constantinople, was the son of Yolande, sister of the Emperor Baldwin I. After the death of Henry, Baldwin's brother and successor, in 1217, Peter de Courtenay, husband of Yolande of Flanders, was called to the imperial throne; but Peter never reached his destination, being treacherously arrested in Epirus by Theodore Angelus, the despot of that country. He died in captivity, but the manner of his death is unknown. First Robert, his son, and then Baldwin, a younger son, succeeded the latter while yet a youth (1237). He continued to hold a precarious dominion in Constantinople till Michael Palæologus, in 1261, compelled him to make his escape, and with him ended the dynasty of the Latin emperors of Constantinople, which had lasted but fifty-seven years from its beginning. Baldwin continued to his death, which occurred thirteen years after, to assume the empty title of emperor, which was transmitted to his descendants for several generations, until the end of the fourteenth century, when it was at last dropped. More than half his reign of twenty-five years was spent in tours round Europe begging for money or men to support the decayed empire. Amongst other desperate shifts to raise money he sold the crown of thorns, universally believed to be the genuine crown of Jesus' martyrdom, for 10,000 marks, to St. Louis of France, who built the celebrated Sainte Chapelle to receive it. (Gibbon, ch. 61, and his authorities.)

BALEARIC CRANE (*Balearica paronina*) belongs to the HETTON family of the wading birds or GRALLÆ. This crane, also called the Crowned Demoiselle, is about 3 feet 6 inches in height, and about 3 feet in length from the point of the bill to the tail. It is conspicuous by the presence of a large spreading tuft of stiff reddish-brown fibres, which spring from the back of the head. The sides of the head are naked and red, and there is a kind of wattle on each side of the throat. This graceful bird is an inhabitant of many parts of Africa, and also extends its range to the Mediterranean islands and the south of Europe. It breeds freely in captivity, and is frequently seen in aviaries. In a state of nature these cranes frequent swampy places, and subsist partly upon fishes, worms, and insects, and partly upon vegetable substances. They run with the wings expanded, and with great rapidity.

BALEARIC ISLANDS are situated in the Mediterranean Sea, off the east coast of Spain, to which country they belong. They are geologically a submarine continuation of the Valencian Mountains, which sink into the sea at Cape Nao. The islands are seven in number, namely, Iviça, Mallorca (Majorca), Minorca, Formentera, Cabrera, Dragonera, and Conejera, the four last mentioned, however, being mere islets, and insignificant both as regards size and population. They lie in a N.E. and S.W. direction, occupying a space of 160 miles in length, by a mean breadth of 30 miles, and having a total extent of about 1749 square miles. Iviça, the nearest to the Spanish coast, being distant from Cape San Martin 60 miles, is about 4 miles long and nearly as wide; Majorca, the central and the largest, lies 43 miles to the N.E. of Iviça, and is 80 miles from east to west by 50 miles from north to south; and Minorca, separated from Majorca by a strait 22 miles in width, is 21 miles long and about 6 miles wide at the broadest parts. The islands are hilly, and Majorca may be termed mountainous, but they are not of volcanic formation. Granite, marble, jasper, porphyry, slate, and pit-coal are found; also lead and iron. The coasts are steep and rugged, surrounded by rocks and islets, but afford some excellent harbours, one of the finest being Port Mahon, in Minorca, which is one of the best in the Mediterranean. The harbour of Palma was much improved by the construction of a mole,

completed in 1882, by which it is rendered perfectly secure. There are no rivers, but the mountain torrents during the rains, or on the melting of the snows, are impetuous. The population in 1888 was 295,000, Majorca having 280,000 inhabitants, Minorca 45,000, and Ivica and the islets 20,000. The islands form one of the forty-one provinces into which Spain is divided, the capital being Palma, in Majorca, a city of 58,000 inhabitants.

The soil is generally very good, and suitable for the growth of the vine and orange; but although improvements have been introduced in recent years, the system of agriculture pursued is still generally of a primitive description. In Majorca, where the soil is fine and productive, and the climate surpassingly genial, much land is devoted to the cultivation of the vine. Oranges, olive-oil, almonds and almond-oil, and fruit and vegetables, are also exported in large quantities. In Minorca, where the soil is extremely rocky and difficult to cultivate, every yard is utilized; and it is here that the best cereals and finest fruits of the islands are produced, though in limited quantities.

Cattle, including horses, mules, pigs, and sheep are fairly plentiful. The mountain springs, instead of being conducted to a channel that would allow of their being utilized, are mostly lost in the torrents of the winter months; while during the summer season there are few parts of the islands that do not suffer more or less from drought.

The climate is very equable, the thermometer rarely falling below 40°, or in summer rising above 90°. The great damp, however, and the sudden cold winds which sometimes prevail, render it unfavourable for invalids.

A tolerably pure feudalism prevails, the Majorcan nobles, with somewhat ultra-insular pride, resisting all innovation from outer circles; and the Spanish law, by which a suitor of equal rank can compel the assent of the parents of his intended bride, is more frequently put into operation than elsewhere. Education is provided by a system better in theory than in practice, as about 85 per cent. of the population can neither read nor write. A railway from Palma, in Majorca, to the port of Alaudia, was opened in 1877.

The islands were formerly possessed by the Moors, who made them the headquarters of their piratical expeditions. They were expelled in 1289. Minorca was taken by the English in 1708, and finally ceded to them by the treaty of Utrecht; but on the breaking out of the war in 1756 it was recaptured by the combined forces of France and Spain. In 1798 it again surrendered to the British, and was occupied by them till 1814, when it was restored to Spain. ("The Balearic Islands," by C. T. Bidwell, London, 1876; Consular Reports, 1883.)

BALEEN, the name given to the horny plates which line the palate of the "whalebone whale," and constitute the "whalebone" of commerce. In the mouth of the whale these plates, about 400 in number, serve to entangle the minute creatures which form its food. The water in many parts of the northern seas swarms with a number of minute forms, pteropods, molluscs, crustacea, ctenophora, medusæ, &c., about the size of a grain of rice after it has been soaked or boiled. The whale, in feeding, draws a large quantity of water into its capacious mouth, which it manages to squeeze out again by the corners; and the little creatures that have been drawn in with the water are held by the loose fibres of the baleen, and swept down the throat of the whale when a sufficient number of them has been gained. It is, perhaps, hardly necessary to say that "right whales" have no teeth. The various uses of baleen or whalebone in domestic life are too well known to need description. The old theory that the baleen plates served as sieves through which the whale "spouted" the surplus water is now completely disproved. The "spout" is indeed the expired breath of the animal, chilled into visibility by the freezing air—and with this is ejected what little water has lodged in the blow-hole.

VOL. II.

BALFE, MICHAEL, a popular Irish musical composer, was born in Dublin in 1808, and displayed a great talent for music at a very early age. The bandmaster of a regiment which was then stationed at Wexford gave him his first instruction as a violin player, and he received lessons in singing from Charles Edward Horn, the composer of "Cherry Ripe" and other popular ballads. His first appearance on the stage was made in 1824, at the Norwich Theatre, when he came out in "Der Freyschütz." After studying in Italy, he appeared in 1827 in Paris as a bass singer, under the name of Balfi, and in company with Malibran and Sontag. After remaining some years abroad, he returned to England and produced his first opera, "The Siege of Rochelle," at Drury Lane, in November, 1835, and achieved an immediate triumph. Other operas were successful; and encouraged by this, in 1839 Balfé became lessee of the Lyceum, but the speculation failed. "The Bohemian Girl," his masterpiece, was produced at Drury Lane on 27th November, 1843, and has enjoyed a singularly prosperous career. Several other operas followed, and all were well received. When the Lyceum was opened under the Pyne and Harrison management, Balfé produced "The Rose of Castile" (22nd October, 1857); and when the same lessees ventured on the larger experiment at Covent Garden Theatre, the industrious composer furnished them with "Satanella" and other operas. A posthumous work, "Il Talismano," founded on the novel by Sir Walter Scott, was produced in 1874, and proved successful, as did also the "Painter of Antwerp," still later (1882). Balfé had great gifts as a musician, but his treatment is to the last degree superficial; and his faults made him popular no less than his better qualities, for, regardless of dramatic truth, he habitually sacrificed everything to the momentary effect of a taking melody. Thus he gained applause for the moment; but it may be safely predicted that, except one or two melodies detached from their former settings, nothing of Balfé's will live. In 1882 a tablet to his memory was erected in Westminster Abbey, close to the monument of Purcell and the grave of Sterndale Bennett. The scores of "The Bohemian Girl" and of the "Talisman" lie beside an excellent medallion portrait by Malepré, and on the other side of the portrait there is a scroll of music bearing the best of Balfé's melodies, "When other lips," &c., which occurs in the first-named of the two operas.

Balfé became late in life the owner of a small landed property called Rowney Abbey, in Hertfordshire, where he died on 20th October, 1870. Kenney's memoir (1875), Macfarren's biography in the "Imperial Dictionary of Universal Biography," and Barrett's "Balfé, his Life and Work" (1882), are the chief authorities for his career.

BALFOUR, SIR JAMES, of Pittendreich, Lord President of the Court of Session in Scotland, was son of Sir Michael Balfour of Fifeshire, and in his early years received a liberal education for the Roman Church. However, he joined the party of the Reformation, and being taken in the castle of St. Andrews when that fortress surrendered to the French auxiliaries in the end of the summer of 1547, was put into the same galley with Knox, and carried prisoner to France. When he returned, he professed himself a Roman Catholic.

On the breaking out of the civil war between the Congregation and the queen-regent in 1559, Balfour took the part of the latter. Soon after the arrival of the young queen in 1561 he was appointed an extraordinary lord of session, and later on he received several offices of dignity. He was with the queen at Holyrood on the night of Rizzio's assassination; and, if we believe her statement, his death also was in contemplation. Balfour saw the influence of Bothwell in the royal closet. To that nobleman, therefore, he attached himself, and quickly joined in the conspiracy against the youthful Darnley. Balfour

framed the bond for mutual support entered into by the conspirators, and prepared the house in the Kirk of Field for the execution of the deed, but was not actually present on the occasion.

On the 22nd of April, 1567, the queen, under the influence of Bothwell, who no doubt imagined he had Balfour bound to him, if by no other tie, at least by that of fear of public justice, appointed him captain of Edinburgh Castle, which he soon afterwards surrendered to the regent, Murray, on conditions very favourable to himself. He was made prior of Pittenweem, member of the Privy Council, and having resigned the office of lord clerk register to please the regent, he secured a pension of £500 a year, and was appointed lord president of the Court of Session. At the battle of Langside, May, 1568, Balfour was in the rear-guard with the regent, and displayed no little valour; yet, in the end of the same year, he was intriguing in favour of

Mary, for which he was arrested, but effected his peace with Murray, and regained his liberty.

On Morton becoming regent Balfour sought to curry favour with him by acts of the vilest treachery. He was mainly instrumental in bringing about the concord called the Pacification of Perth, in February, 1572, whereby his late coadjutors were given over to the tender mercies of the regent. In July, 1572, Morton brought his victims to trial for Darnley's murder, and had them sentenced to the scaffold. Balfour, however, not only escaped a trial, but the following year had his forfeiture annulled, and himself restored by Act of Parliament; and in 1574 the regent committed to him and Skene a design for a general digest of the laws. Balfour did not remain much longer in the country; dreading the ground on which he stood he fled to France, where he continued till the young king of Scotland assumed the reins of government. He then returned to



Pass of the Balkan.

his native country, and joined the party who watched for the destruction of the yet formidable Morton. In 1579 Morton recovered his authority, Balfour again fled from before him, and the forfeiture was re-enacted which had been pronounced in 1571. The death of Morton was now to be accomplished; and as Balfour had taken care to preserve the bond by that nobleman and others in support of Bothwell in the murder of Darnley, a plan was speedily devised: Morton was accused of treason, tried, convicted, and beheaded.

This was Balfour's last public act. He died soon after, in the year 1583. His one object in life was his own self-interest, and in the pursuit of this he was so utterly unscrupulous that he fairly deserves the appellation of "the most corrupt man of his age."

BALFRON', a village and parish in Stirlingshire, 16 miles W.S.W. from Stirling, and 19 miles N.N.W. from Glasgow, is built at the foot of the Campsie Hills. There is a large cotton manufactory in the neighbourhood. The population in 1881 was 1327.

BALI. See **BALLY**.

BALISTES. See **FILE-FISH**.

BAL'KAN is a name which properly belongs to that range of mountains which, lying between 42° and 48° N. lat., and 23° and 28° E. lon., divides the plains on the Lower Danube from the rivers running southward to the Archipelago. The range also forms the boundary between Bulgaria and Eastern Roumelia.

The most considerable mountain chain, and that which, by an extension of the term, may be called Balkan, runs

from the Adriatic Sea to the Black Sea. It begins on the shores of the Adriatic with the rocky peninsula of Sabioncella, opposite the island of Curzola, and soon assumes an extremely wild and alpine character in the mountains of Czerna (pronounced Cherna), Gora, or Montenegro. Proceeding further east, between Servia and Albania, it increases in height in the mountains of Perserin, which join the Shard Dagh, or Kara Dagh (the *Mons Scardus* of the Romans). The highest part of the range lies still further to the east, where it receives the names of Gliubolin, Argentar, and Egrisu. Some summits here attain the point of perpetual snow. To the west of Sophia, near the sources of the Isker, a tributary of the Danube, and those of the Struna (*Strymon*), is Mount Orbelus, 9000 feet above the sea, and one of the most elevated summits of the whole system. From this point the range declines to the south-east, but it resumes its eastern direction again at the sources of the Maritza (the *Ilebrus*), and from this point to its termination on the shores of the Black Sea it is called Balkan, or Eminch Dagh; the latter name is derived from Cape Eminch, with which it terminates on the Black Sea. This portion of the range is considerably lower than that further to the west; its mean height does not exceed 3000 or 4000 feet above the sea. It forms the *Hæmus* of the Greek geographers, probably so called from its cold and snowy climate. The range is distinguished by craggy summits and steep slopes, and there are very few practicable routes across it. The passage of the Balkans by the Russian army in the depth of winter, in 1878, was one of the most memorable incidents of the Russo-Turkish war of 1877-78. Under the treaty of Berlin the Turks were empowered to occupy some fortified positions in the Balkans, but they have never exercised their right in the matter.

The Balkans are united to the mountains of Middle Europe by the Dinaric Alps, which separate the lowlands of Hungary from the Adriatic Sea; and by the Bulgarian Mountains, which extend from the Balkans to the Carpathians. The country between these two offshoots, comprising Bosnia and Servia, is quite of an alpine character.

The mountains are for the most part of granitic formation, and are said to contain a variety of valuable minerals, but they are very imperfectly known in this respect.

BALKH. See AFGHAN TURKISTAN.

BALL. The use of the ball as a means of amusement dates from the earliest times, and many of the games now in vogue have come down from the gymnasias of the ancient Greeks and Romans. By the ancient Greeks, with whom mainly exercises were a passion, ball games were highly prized as a means of giving grace and elasticity to the body. Ball games were also very popular as court games during the sixteenth century in Italy, France, and England. Frequent references will be found in writers of that period to the games of Tennis and Paile Maille. The latter game, which was played in a long alley, consisted in striking a ball through a high arch of iron standing at either end with a mallet or "mall," the player who succeeded in achieving this with the fewest strokes being the winner. The playing of this game in a long alley near St. James, London, gave rise to the name Pall Mall.

At the present period the game of Cricket forms the most popular ball game of England, while the game of Golf may be regarded as the first ball game of Scotland. Cricket, however, is now also largely played in Scotland, and Football has become increasingly popular in both countries. Croquet, a game in many respects resembling the old game of Pall Mall, was up to a recent period an exceedingly popular ball game, but about 1880 it was quite superseded by the more active game of Lawn Tennis. The very old game of Raquets, and the similar game played with the hand called Fives, are still in vogue, though for the

moment partly eclipsed by their younger rival. These games will be found fully described under their respective headings.

BALL was in former times the name given to all kinds of spherical projectiles used in warfare, from the bullet of the musket or pistol to the round shot of the cannon. The introduction of rifled fire-arms has in later times caused most of the projectiles used to be of an elongated cylindrical form, and they are termed now either bullets, shot, or shell, according as they are used for small-arms or in a solid or hollow form for artillery. The bomb, however, still retains its spherical form, and several forms of ball are still used in both military and naval affairs for various purposes. The ground light-ball consists of a skeleton framework covered with painted canvas and filled with an inflammable composition which is lighted by a fuse. It is used to give out a bright light which may serve to discover the movements of an enemy during the night, whether at a siege or in the field. Another light-ball, invented by Colonel Boxer, is designed to burn in the air and illuminate the ground beneath. It is formed of a thin shell composed of wrought iron inclosing two hemispheres of the same metal, in one of which is placed the inflammable composition, and in the other a parachute of calico attached to the receptacle of the composition by chains. By means of a fuse the shell is exploded when it reaches its highest point in the air, and the hemisphere containing the parachute falls off with the outer casing, leaving the lighted composition to be buoyed up by the parachute, and slowly descend to the ground. Another light-ball that has been more recently brought into use serves to liberate in the air a cloud of stars similar to those used in the ordinary rocket, which while descending cast a bright light upon the ground below. Smoke-balls are made by filling a thick paper casing with a composition of gunpowder, saltpetre, coal dust, pitch, and tallow, which gives off a dense smoke, and in any closed place, such as a mine or casemate, would serve to blind or suffocate an enemy. Other projectiles of a still more poisonous character have been devised by inventors, but their use finds but little favour with military men. A light-ball that would burn on water, and could be thrown from a mortar on the deck of a ship, has been proposed as a means of warding off the attacks of torpedo boats, but it has not been adopted in the service, greater reliance being placed upon the powerful electric light for this purpose.

BALLAD, a popular song or roundelay, really from the Low Latin *ballare*, to dance (whence our *ball*, or dance assembly), and meaning a dance tune, whence by development a simple poem in stanzas suitable to a tune of such a simple rhythm, and finally a poem of this character regardless of music. Ballads and rude poetry have been in all countries the earliest memorials of public transactions, and in the savage state of each were invariably used to rouse and perpetuate a martial spirit. No less than 10,000 ancient English ballads are enumerated by collectors. Thus the finest ballads of our old land, such as "Chevy Chase," the "Death of Douglas," &c., commemorate the wild and lawless forays of the Border. No country, except Spain, possesses so rich a collection. The Robin Hood ballads are another series, forming a small epic in themselves. In process of time, as manners grew refined, the ballad in every country by degrees included a wider range of subjects; it was no longer solely employed in rehearsing valorous deeds, but included in its rhymes the marvellous tale or the wild adventure, occasionally becoming the vehicle of sentiment and passion. No festivity was esteemed complete among our ancestors, in the eleventh, twelfth, and thirteenth centuries, which was not set off with the exercise of the minstrel's talents, who usually sang his ballad to his own or some other harp, and was everywhere received with respect. Constructed like the Homeric poems and the

Spanish romances, on a certain regular model, these ballads, like the works just named, abound in recurring expressions, phrases, or *burdens*, or in repeated epithets, &c., which must be regarded as the accepted aids to the composer's imagination. They are now quite invaluable from the insight they afford into the manners and modes of thinking of remote times; while the strokes of nature with which they abound, and the artless simplicity of their language, excite the admiration of just critics.

Among numerous other collections of our own national ballads, Percy's "Reliques," Evans' "Old Ballads, Historical and Narrative," the Roxburghe collection of 2000 pages (in the British Museum), and Ritson's "Ancient Songs from the time of Henry III.," stand conspicuous. Pinkerton, Jamieson, and Finlay have collected the Scotch ballads; and Sir Walter Scott the "Minstrelsy of the Scottish Border."

The ballad has been used by modern writers as a form of literary expression very successfully. When we think of Goldsmith's exquisitely touching "Edwin and Angelina," of Scott's stirring "Lochinvar," of Macaulay's heroic "Lays of Ancient Rome," and of the weirdest, strangest, perhaps finest of all ballads of all time, Coleridge's "Ancient Mariner," we are face to face with masterpieces of literary excellence and power.

BALLAD, in music, now means a short air, repeated to two or more stanzas, simple in construction, and therefore confined in modulation, and having an accompaniment of a strictly subordinate kind. When an air or its accompaniment is florid, or modulates into distantly-related keys—when, in short, either of them assumes a more elaborate form, the composition generally takes the name of Song or Canzonet, even when several stanzas are repeated to the same melody.

BALL-AND-SOCKET JOINT is a joint the nature of which is indicated by its name. Its use lies in its ability to move horizontally, vertically, or obliquely. It is used for astronomical and other instruments; and in that wonderful collection of mechanical contrivances, the skeleton of vertebrates, amongst whom man is the chief, ball-and-socket joints are used in the hip, shoulder, ribs, &c. [See ARM, BACKBONE, &c.] In snakes and some fishes even the backbone is so jointed.

BALL'ARAT, a large and flourishing city in Victoria, Australia—being next in importance to Melbourne, the capital. It is the centre of perhaps the richest gold-yielding district in the world. It lies 100 miles by rail W.N.W. of Melbourne, at an elevation of 1413 feet above the level of the sea, and consists of Ballarat East and Ballarat West, the Yarrowee Creek dividing them. Each is a distinct municipality, under the government of a mayor and councillors. Ballarat West has an area of 2880 acres, and has most of the improvements of large towns of much older growth. There are good public buildings, several churches and schools, and numerous handsome shops; also a theatre and several places of amusement. The banks are located in substantial buildings, and there are, in fact, nearly all the accompaniments of a metropolitan city. A railway connects it with Melbourne, and it is also connected with all the other railways in the colony. The town contains several iron-foundries, breweries and distilleries, flour-mills, and factories.

Gold was first discovered at Ballarat in June, 1851. The extraordinary richness of the ground rapidly attracted a large concourse of diggers and followers, who laid the foundation of a wealthy and prosperous town. As the surface digging became exhausted, it was found that richer deposits of the metal could be obtained at lower depths. At the present time there are mines as deep as some of the coal-pits of England, worked by extensive steam pumping and other machinery. One of the largest pieces of natural gold in the world was taken from Bakery Hill. It was found at a depth of 180 feet, weighed 2217 oz. 16 dwts.,

and was called the "Welcome" nugget; it was sold for £10,500. The "Lady Hotham" nugget, found near Canadian Gully, at a depth of 135 feet, weighed 1177 oz. 17 dwts. The yield of gold for 1881 was 106,455½ oz. The geological formation of the district is Silurian, on primitive slate and sandstone. The population of Ballarat West in 1881 was 22,425; and of Ballarat East, 16,044—total, 38,469.

BAL'LAST, a term used to denote any heavy material placed in a ship's hold with the object of sinking her deeper in the water, and of thereby rendering her capable of carrying sail without danger of being capsized. Ships are said to be in ballast when they sail without a cargo, having on board only the stores and other articles requisite for the use of the vessel and crew, as well as of any passengers who may be proceeding with her upon the voyage. In favour of vessels thus circumstanced it is usual to dispense with many formalities at the custom-houses of the ports of departure and entry, and to remit the payment of certain dues and port charges which are levied upon ships having cargoes on board.

For several hundred years the Corporation of the Trinity House retained the monopoly of supplying ballast to all vessels leaving the river Thames. The quantity has annually amounted to about 750,000 tons, and has always been dredged from the river. In 1865 the monopoly ceased, and the ballast trade is now open. The substances most generally used for ballast are iron, gravel, sand, and water, the first and last of these being most in use.

Regulations have at various times been made in different ports and countries determining the modes in which ships may be supplied with ballast, and in what manner they may discharge the same—such regulations being necessary to prevent injury to harbours.

In engineering the term ballast is used to designate the sand, gravel, or broken stone that is beaten down and packed under and between railway sleepers in order to give them firmness and strength. No line is open for transit until it has been ballasted, and the cost of ballast forms an important item in a railway contract.

BAL'LATR, a village of Aberdeenshire, situated on the banks of the Dee, 86 miles from Aberdeen. It is much frequented during summer on account of its chalybeate springs. The place is well drained, and enjoys a fine bracing air and an equable climate. Altogether it is pleasant, neat, and clean, and deservedly popular as a health resort. The resident population at the census of 1881 was only 759.

BALL-COCK, a hollow sphere or ball of metal, attached to the end of a lever, which turns the stop-cock of a cistern-pipe, and regulates the supply of water. It floats by its buoyancy, and rises and sinks according to the quantity of water in the cistern.

BAL'LENY ISLES, a cluster of islands in the Antarctic Ocean discovered by Mr. John Balleny and Mr. H. Freeman, on 9th February, 1839. It consists of five islands, which, proceeding from E. to W., are called Sturge Island, Buckle Island, Borradale Island, Young Island, and Row Island, from the names of some of the patrons of the expedition. Borradale Island, the central one of the group, lies in 66° 44' S. lat., 168° 11' E. lon. Immediately to the east of it is a remarkable rock called Beale's Pinnacle, which is described as rising like a tall lighthouse from the waters.

BAL'LET, a theatrical representation, in which a story is told by gesture, accompanied by characteristic or illustrative music, and to which dancing, scenery, decorations, &c., are the accessories. The name, derived from the Latin *ballare*, should mean simply a dunce, but was first applied in modern Europe to those magnificent dramatic and musical spectacles which were introduced into the courts of Italy during the early part of the

sixteenth century. Such entertainments formed an important feature in the public rejoicings on the occasion of royal marriages or the celebration of victories, and kings and queens, with the members of their courts, all took part in the performances. In France, where the ballet was introduced by Balthazerini, director of music to Catherine de Medici, it soon became exceedingly popular. In 1581, Henry III. having married his favourite, the Duc de Joyeuse, to Mademoiselle de Vandemont, sister to his queen (Louise de Lorraine), a ballet was produced on the subject of Ceres and her nymphs, which was performed at the Louvre, and the queen and her ladies took part in the spectacle. Both Louis XIII. and Louis XIV. appeared and danced in the ballets that were represented at their courts, the last appearance of the latter being in 1699.

In these performances the actors also employed the aid of recitation and singing, as well as the more strictly legitimate dancing and pantomime, appropriate music being composed and employed for the songs and dances.

In the rise of modern opera the ballet was retained, but in the middle of the eighteenth century Noverre separated the ballet from the opera, using it by itself as a systematic expression of the drama. He attempted the representation of the most lofty subjects by its means, tragedies like "Medæa" and "Hamlet" being performed as ballets; and in his work entitled "Lettres sur les Arts Imitateurs" (Paris, 1807) has explained his theory on the subject. The meaning of the word has returned very much to its original purport, and the ballet is now an ornament of operas or spectacles, such as a Christmas pantomime, introduced to relieve the steady progress of the dramatic part of the entertainment by an exhibition of dancing. Ballet-dancing becomes year by year more graceful, and, happily, less indecent in costume; and the large and skilfully varied combinations of many dancers, frequently now to be seen at our largest theatres, fill the stage with shifting harmonies of colour and graceful interweaving forms of motion. Tasteless displays of dexterity, and disgusting scantiness of clothing, will soon, it is to be hoped, be nowhere found degrading the ballet.

A pithy sentence from Carlyle ("Misc." vii.), describing a visit to the opera, will soon be historically valuable, and as such it may be quoted here:—"The ballet-girls with their muslin saucers round them" (saucer-shaped stiff petticoats standing out straight, or near it, from the waist) "were little short of mimulous; whirling and spinning there in strange, mad vortexes, and then suddenly fixing themselves, each upon her left or right great toe, with the other leg stretched out at an angle of ninety degrees—as if you had suddenly pricked into the floor by one of their points a pair, or rather a multitudinous cohort, of mad, restlessly jumping and clipping scissors, and so bidden them rest with opened blades, and stand still, in the devil's name! Motion peculiar to the opera; perhaps the ugliest, and surely one of the most difficult, ever taught a female creature in this world. . . . Perhaps neither Semiramis nor Catherine the Second had brod herself so carefully" as the chief dancer of the evening, Cerito.

BALLET, in music, a part song in strict writing of the madrigalian type, a very favourite form with the Elizabethan composers. It had a *fa-la-la* at the close of each stanza; and originally, it is believed, actually accompanied dancing. Gastoldi's Ballets (1532-1598) are amongst the earliest, but Morley's "Ballets to five Voyces" (1595), and those of Weekes with the same title, are much finer compositions. It is sufficient to mention Morley's ballet—

"My bonny lass she smileth,
When she my heart beguileth,
Fa, la, la!"

to indicate the highly characteristic style; for this sprightly masterpiece is probably known to every musical reader, having retained unflinching popularity to this day.

BALLINA, a small town and port of Ireland, in the county of Mayo, 18 miles N.N.E. from Castlebar. The town is pleasantly situated on the banks of the Moy, which here separates the counties of Sligo and Mayo, and is crossed by two bridges. The river affords excellent salmon fishing, and is the resort of many anglers during the summer season. The population of Ballina proper in 1881 was 4318; of the portion of the town in the county of Sligo, which is called Ardarae, 1442; total, 5760. The town has been much improved of late years, and its trade has greatly increased. It is the seat of a poor-law union, with a large workhouse, and has breweries, flour-mills, and manufactures of snuff. There is also a good trade in cured provisions and salmon. The public buildings comprise a fine old Episcopal church, a large Roman Catholic chapel, handsome convent, Baptist and Methodist chapels, a sessions-house, and some branch banks. The number of vessels which annually enter at and clear from the port is each about 150, of little over 20,000 tons burden. The customs revenue in 1882 was £1200. In 1798 Ballina was for a short time in the possession of the French under General Humbert.

BALLINASLOE, a town of Ireland in the counties of Galway and Roscommon, is situated on both sides of the river Suck, 8 miles from its outfall into the Shannon, and 35 from Galway, and 91 from Dublin. The Grand Canal extends from the Shannon to Ballinasloe, and has considerably improved the corn-trade of the district. There is a station of the Midland Great Western Railway in the town, which is tolerably well built, clean, and paved. It has a court-house, a district lunatic asylum, union workhouse, church, Roman Catholic chapel, Methodist and Presbyterian meeting-houses, and several schools. A very large sheep, cattle, and horse fair is held annually on the first Tuesday in October, and lasts five days. The average number of sheep sold is from 60,000 to 70,000, and of cattle from 6000 to 7000. The population in 1881 was 4772-3825 being in Galway and 947 in Roscommon. The battle of Anglin, in 1691—in which the army of William III., under Ginkell, afterwards Earl of Athlone, completely defeated that of James II., under the command of St. Ruth, who was killed in the action—was fought in the neighbourhood.

BALLINROBE, a town in Ireland, in the county of Mayo, is situated on the Robe, a stream which falls into Lough Mask, 3 miles W. The town consists chiefly of a main street and two branches of well-built houses. It contains a sessions-house, union workhouse, church, and Roman Catholic chapel. The population of the town in 1881 was 4949.

BALLIOL COLLEGE, Oxford. The founder of this college was John Balliol, or de Balliol, of Barnard's Castle, in the county of Durham, a man of great opulence and power in the thirteenth century, and a steady adherent to King Henry III. in all his wars and contests. The wealth and political consequence of John de Balliol were dignified by a love of learning and a benevolence of disposition which, about the year 1263 (or 1268, as Wood thinks), induced him to maintain certain poor scholars of Oxford, in number sixteen, by exhibitions. On his death, in 1269, he recommended only the objects of his bounty to his lady and his executors, leaving no written deed or authority for their support. As what he had previously given was from his personal estate, now in other hands, the care of them would in all probability have ceased, had not his widow, who is styled the Lady Dervorgilla, been persuaded to fulfil his intention in the most honourable manner by taking upon herself their future maintenance. She established a residence for the scholars; the foundation was confirmed by the founder's son, John Balliol, afterwards king of Scotland; and a number of benefactors promoted the purposes of the founder by enriching the establishment with gifts of land,

money, and church livings. At the beginning of the fourteenth century, however, the revenues were so insufficient that many of the scholars were obliged to relinquish their studies, and even to follow mechanical trades for a maintenance. But gradually various benefactors stepped forward to relieve them in this distress and to support the college; and during the succeeding five centuries endowments of high value have raised this college to the distinguished rank which it holds.

There are now fourteen fellowships and fifteen scholarships on the old foundation at this college; the latter of about £80 a year, and tenable during residence for five years, open to candidates under nineteen years of age. There are five scholarships of £60 a year, for persons educated at Blundell's School, Tiverton, on the foundation of Mr. Peter Blundell; one of which is to be filled up annually by examination at the school. There are four mathematical scholarships, tenable for four years, of the value of £80 a year. There are also eight scholarships, of £80 a year, tenable for four years, "for the encouragement of the study of law and history, and of the study of natural science, in order to qualify students for the professions of law and medicine respectively, founded by Hannah, daughter of Mr. Francis Brakenbury. The Warner exhibition, of about £90 a year, tenable during residence for five years, is confined to natives, or those whose fathers were natives of Scotland. The nomination to the Snell exhibitions (ten in number) is vested in the principal and professors of Glasgow University, and the election in the master and fellows of this college. One or two of these are annually filled up by an examination held at Glasgow. They are tenable during residence for five years.

Two exhibitions of £100 a year, tenable for four years, were founded under the will of Richard Jenkyns, D.D., once master of the college; to be filled up by competition among those members of the college who have not exceeded sixteen terms of academical standing. Three exhibitions (or more, according to circumstances) of £70 a year during residence, tenable for five years, are annually offered by the college for open competition among all candidates who have not completed the eighth term from their matriculation. There are also a certain number of minor exhibitions of £40 a year during residence.

The college hall, which is on the west side of the quadrangle, was originally built in the reign of Henry VI.; but the present interior is modern. The interior of the library was rebuilt about the beginning of the present century, by Wyatt, in imitation of the Gothic style. Additional buildings in connection with the college were erected in 1863, and somewhat later an elaborate chapel was built. Both are Gothic in style, though very different in character, and both are far surpassed by some further new buildings, completed in 1869. They are, of course, Gothic, but possess a more distinctive character. They cost about £30,000, and were a gift from Miss Brakenbury, daughter of an old scholar. A new hall was built in 1879, worthy to rank with the best of the old halls of Oxford. (*Oxford University Calendar*, 1885.)

BALLIOL, JOHN DE, King of Scotland, was the son of the Sir John de Balliol who founded the celebrated BALLIOL COLLEGE at Oxford, and at the death of the "Maid of Norway," only grandchild of that Alexander III. of Scotland whose youth his father had guarded more or less faithfully, Balliol put in a claim to the crown. He was descended from a niece of William the Lion; Robert Bruce, a competitor, sprang from a second niece; and Hastings, another competitor, from a third. Edward I. of England, who assumed to be overlord of Scotland, was appealed to, and he at once assumed all fœdal rights, and occupied the country with his soldiers while he investigated the rival claims. This investigation he conducted with that love of justice which has made him to be called the "Eng-

lish Justinian," and which led him to enrich the law with so many important statutes. He decided for Balliol, who at once did homage; but on Edward's afterwards claiming judicial supremacy—that is, the right of appeal to England from Scotch decisions—Balliol was forced by his baronage to resist the claim. His resistance was encouraged secretly by France, and openly by the pope, who absolved him from his oath of allegiance. Edward at once marched into Scotland, which could not long resist the foremost warrior of his time; and Dunbar saw John Balliol a captive, passing without a blow from a throne to a prison. He surrendered his crown to Edward, and with his son was lodged in the Tower of London. By the intercession of the pope, Balliol was allowed to retire into France, where he lived upon an estate he held there, and died in 1314. His son, Edward Balliol, was received kindly at the court of Edward III., and taking advantage of the death of Robert Bruce, king of Scotland, he made a snatch at the Scotch crown in 1332. The English king had formally prohibited the enterprise, but when it unexpectedly succeeded, and Edward Balliol was crowned at Scone, while the boy-king David Bruce fled for safety to France, Edward III. saw fit to acknowledge him on condition of his own overlordship being acknowledged. Balliol's compliance with this condition cost him his crown, for his angry subjects drove him with ignominy from the realm he had thus degraded. He died without issue, and the family became extinct. The prior claim, by birth, to the Scottish crown now devolved upon the Bruces, who originally had an inferior title to that of the Balliols, being descended from a younger (female) branch.

BALLIUM. This term, according to Dufresne, anciently meant an outer bulwark, but was afterwards adopted for the area or courtyard contained within one. It appears clear from the word, and its original use, that it is a corrupted form of the Latin *vallum*. The ditch of a royal castle was sometimes called the Ditch del Bayle, or of the Ballium, to distinguish it from the ditches of the interior works. Over it was either a standing or a draw bridge, leading to the ballium. In towns, the appellation of ballium was given to a work fenced with palisades, and sometimes masonry, covering the suburbs. The name Bailey, as the Old Bailey, in London, and the Church of St. Peter in the Bailey, in Oxford, seems to have been derived from ballium.

BALLOONS and BALLOONING. Aerial navigation, the faculty of locomotion through the air, the power of soaring bird-like into the azure fields of space, has always been tantalizingly seductive to the human imagination, and the advent of the first balloon caused great anticipations which have not yet been realized. Aerostation was to disclose the secrets of the atmospheric world, and to be the means of facilitating the production of abundant and excellent harvests. Meteorological experiments have been the medium of interesting approaches in this direction, but the management of the new invention was, and indeed is yet, understood by few persons; and although you may ascend from any point, it is only experts who can predict where or how you will descend. Uncertainty, especially with unskilled amateurs, still attends aerial voyages; and the balloon is so much at the mercy of currents of air, that the course it will follow is not always an affair of the will or choice of the aeronaut.

The principle in virtue of which a balloon ascends is exactly the same as that which causes a piece of wood or other material to float partially immersed in water, viz., that if any body float in equilibrium in a fluid, the weight of the body is equal to the weight of the fluid displaced. Thus if a body lighter than the air it displaces is set free in the atmosphere, it rises to a height where the air is so attenuated that the weight of the volume of air displaced is equal to that of the body, when equilibrium takes place,

and the body ascends no higher. After the invention of the balloon by the brothers Montgolfier, it was concluded that there was a great analogy between sailing on the water and sailing in air, and that no very great difficulty would be found in devising a suitable steering apparatus; in fact it was supposed that to rise in the air and remain there was the chief difficulty, and that, this being accomplished, the power of directing the aerostat would be a secondary achievement that must follow before long. Accordingly, in many of the early balloons the voyagers took up oars, sails, or paddles, which they diligently worked while in the air; and as different currents in the atmosphere frequently occur, it is no wonder that some should have announced with confidence that their course was changed from that of the wind by means of the sails or oars that they used. An aeronaut can often change the course of his balloon by raising or lowering it, and thus getting into a different current of air which may suit the direction he wishes to go in. The analogy between sailing on the water and sailing in the air is altogether fallacious; for in the one case the vessel floats on the surface of the water, in the other it must float totally immersed in the aerial fluid. A ship, while sailing, is acted on by two fluids—the water supporting and the air propelling it; but a ship sailing in the air would be only under the action of the one fluid that surrounds it on all sides. If a sort of sail surface be exposed from the car, to act as rudder and guide the direction of the machine, it is of course only so much more surface to be acted upon by the completely enveloping current; while, if it were possible to propel the car in a direction contrary to the wind, the chances are that the great volume of the supporting power—the balloon—would incline one way and the car another, with a tendency very dangerous for the voyagers. It amounts to this, that after the lapse of a hundred years since the balloon was invented, man is not much nearer the consummation of being able to fly. Rarefied air or gas enables him to ascend and descend, but he is utterly baffled in all his attempts—and they have been very numerous—to propel himself in any given horizontal direction.

The actual means by which ascension is accomplished is a French invention; and its name, "balloon," is derived from the French *ballon*, a football, a name applied generally to any hollow spherical body. The first idea of a real balloon was suggested by the Jesuit Francis Lana, in a work published in 1670. His notion was to raise a vessel by means of hollow metal balls, strong enough, when exhausted, to resist the pressure of the external air, but so thin as to be, under such circumstances, lighter than their bulk of air (see fig. 1, Plate I.); but had he tried the experiment, he would have found the requisite strength incompatible with the necessary degree of thinness and lightness. The actual invention of balloons, however, is of much later date, and is due to Stephen and Joseph Montgolfier, sons of Peter Montgolfier, a well-known paper manufacturer at Annonay, near Lyons. In 1783 the brothers, having previously ascertained, by a number of experiments, that air when heated to the temperature of 180° loses half its weight, determined to fill a structure composed of very light material with this rarefied air, so that it should be able to raise itself from the earth in spite of the weight of its own covering. They first made a small balloon, which rose to the roof of their apartment; they then tried the same experiment in the open air privately; and finally, on the 5th June, 1783, gave a public exhibition of their discovery at Annonay, before the principal inhabitants of the neighbourhood. A linen globe, 105 feet in circumference, was inflated over a fire fed with small bundles of clopped straw, and when released rose rapidly to a height of about 6000 feet, and descended, at the expiration of ten minutes, at a distance of a mile and a half.

The Montgolfiers' success set all the world dreaming of

aerial voyages, and a subscription was started to have the experiment repeated at Paris. The balloon used was constructed of silk by two brothers named Robert, under the superintendence of M. Charles, a professor of natural philosophy in Paris, and was about 13 feet in diameter (fig. 2, Plate I.) Instead of copying the Montgolfier process, Charles filled the balloon with hydrogen gas, obtained by the action of dilute sulphuric acid upon iron filings, proceeding which would have been less tedious and difficult had the gas been passed through cold water. Bulletins were issued daily of the progress of the inflation, to complete which about 500 lbs. of sulphuric acid, and twice that amount of iron filings, were used. On the 27th August, at the signal of the booming of a gun, the balloon ascended from the Champ de Mars, in the presence of an immense concourse of spectators, who long watched it intently, spite of a heavy rain which drenched them to the skin. It rose to over 3000 feet, and in about three-quarters of an hour fell in a field near Gonesse, where the country folk, believing it to be some terrible flying monster, set upon it with guns and pitchforks till it was torn to pieces.

Thus far the balloons had been sent up without any live freight, but now people began to speculate on the possibility of a man risking his life aboard the frail machine. Louis XVI., however, refused to listen to such a proposal, but permitted a sheep and some pigeons to be suspended in a wicker cage attached to the neck of the balloon; and as all of them descended in safety, the success of the experiment served to whet public curiosity. Was it impossible or desperately dangerous for men to travel in balloons? was the question eagerly mooted; and presently a courageous young man was found, the hero and protomartyr of ballooning, who was ready to risk his life in the enterprise. M. Pilatre de Roziers first went up in a balloon with tackle attached to it, and this trial afforded proof of a very comforting but hitherto hotly-disputed fact, namely, that when the rarefied air was slowly exhausted, the balloon would sink gently and not fall violently to the ground.

The first aerial voyage took place on 21st October, 1783, when Roziers, accompanied by the Marquis d'Arlandes, ascended in an ordinary fire balloon from the gardens of La Muette, near Paris, and after a flight of twenty-five minutes, during which their vehicle rose to the height of 3000 feet, came down safely. The marquis wrote a very lively and interesting account of this first human journey through the realms of air.

On 1st December of the same year Professor Charles ascended in a balloon inflated with hydrogen gas, and succeeded in ascending to a height of 9000 feet, which was then thought to be enormous. On the 15th of the same month MM. Charles and Robert left the grounds of the Palace of the Tuileries in the presence of a vast concourse of people. The weather was exceedingly fine, and after a trip of two hours they descended at a distance of 9 leagues from Paris. M. Robert here left the car, and M. Charles reascended alone. Relieved of M. Robert's weight the balloon mounted rapidly to a height of 2 miles, causing the aeronaut to experience violent pain in the head. He came down safely, however, in about half an hour.

This was the last ascent of M. Charles, to whom are due some of the early features of the balloon; but as now used—the valve at the top, the suspension of the car from a hoop, and an elongated net-work—the mechanism has advanced. It was also M. Charles' idea to expand the balloon with a gas lighter than the ordinary air, as distinguished from the heated air or fire balloon of the Montgolfiers.

There were three aerial ascents in 1783, but the number now speedily increased, there being no less than fifty-two in the following year. In the first of these, on 19th January, what is said to have been the largest balloon on record

ascended from Lyons (see fig. 3, Plate I.) It was more than 100 feet in diameter, about 130 feet in height, and had a capacity of over 500,000 cubic feet. It was inflated with a straw fire in seventeen minutes, and carried up seven persons, among them being Joseph Montgolfier and Pilatre de Roziers. The balloon rose very majestically to a height of 3000 feet, but remained up only forty-five minutes, & rent in its upper part hastening the descent. In March of the same year M. Blanchard, the celebrated French aeronaut, made his first ascent from Paris in the balloon shown in fig. 4. He mounted high above the clouds, and attained an elevation of 9600 feet. MM. Morveau and Bertrand ascended from Dijon in April, 1784, when they attained the height of 13,000 feet, and travelled 18 miles in twenty-five minutes. In July M. Robert ascended from Paris with the Duc de Chartres and other gentlemen. Within the hydrogen balloon was inclosed a smaller one filled with common air. They ascended to a height of 5100 feet, and were greatly beaten about by an eddy or revolving current. The gas expanded; they had no valve, and the inner balloon choked up the aperture of the neck and permitted no escape. In this dilemma, at the mercy of a whirlwind, they decided to make a rent in the outer covering. The Duc de Chartres himself took one of the banners and made two holes in the balloon, which formed an aperture between 7 and 8 feet in length. The gas escaped in volumes through the open rents, and they came down with great velocity, but no one was injured.

In January, 1785, M. Blanchard and Dr. Jeffries crossed the channel in a hydrogen balloon from Dover to Calais. From some defect in the gas, or deficiency in its amount, or practically because the balloon was too small, they could with difficulty keep themselves at a level above the sea, and to do so were obliged to part with everything in the car, and even take off their clothes and throw them overboard. As they neared the land, however, the balloon rose, and describing a magnificent arch, carried them over the high ground surrounding Calais, and finally landed them in the forest of Guines. On 15th June following, M. Roziers and M. Romain ascended from Boulogne with the same object (that of crossing the channel) in a Montgolfier, having a gas-balloon overhead, which caught fire and precipitated them from a height of 3000 feet. Roziers, who was, with the Marquis d'Arlandes, the first man ever to ascend in a balloon, was the first to meet with a fatal accident in connection with aeronautics. He was killed on the spot, and Romain only survived about ten minutes. A monument was erected on the spot where they fell, which was near the sea-shore, about 4 miles from the place from which they ascended.

In the beginning of the next century the name of M. Garnerin is closely associated with balloon history, and replaces that of M. Blanchard. He made the first parachute descent in England. On 5th July, 1802, he ascended from Marylebone; the wind was high, but he rose to a height of 7800 feet, and descended at Clingford, near Epping Forest. His fame as an aeronaut was considerable, and his popularity about this time was at its culminating point with the people of the metropolis, who were in a state of tumult to witness his ascent. This was his twenty-seventh voyage in Europe.

In 1804 Professor Robertson ascended from St. Petersburg, accompanied by the academicien Sacharof. This was purely a scientific voyage, instituted at the request of the Russian Academy, to ascertain the physical state of the atmosphere, and the component parts of it at different determinate heights; also the difference between the results given by vertical ascent and the observations of De Luc, Saussure, Humboldt, and others on mountains, which it was rightly concluded could not be so free from terrestrial influences as those made in the open air.

On 7th October, 1803, Count Zambeccari, Dr. Grassati

of Rome, and M. Pascal Andreoli of Ancona, made a night ascent in a fire-balloon from Bologna. They took with them instruments and a lantern by which to see to make observations. The balloon rose with great velocity, and soon attained a height at which Count Zambeccari and Dr. Grassati became insensible. M. Andreoli, however, retained the use of his faculties. About two in the morning they found themselves descending over the waves of the Adriatic; the lantern had gone out, and to light it was a work of no little difficulty. The balloon continued to descend rapidly, and fell, as they anticipated, into the sea. Thoroughly drenched, they succeeded in throwing out ballast until they rose again, and passed through three successive regions of clouds, which covered their clothes with rime; and in this situation they became deaf, and could not hear each other speak. About three o'clock the balloon again descended, and was driven by a gust of wind to the coast of Istria, bounding in and out of the sea till eight o'clock in the morning, when one Antonio Bazon picked them up in his ship, and carried them to shore. The balloon, left to itself, went over to the Turks, having first mounted to an amazing height. The most intense interest was excited for the fate of the aeronauts, and bulletins of health were sent from Venice to Bologna. Count Zambeccari suffered most, and was forced to have his fingers incised. The whole of the party, however, ultimately recovered, and Count Zambeccari, in no way intimidated, continued to persevere in making ascents to a considerable height. In the year 1812, accompanied by Signor Bonagna, he ascended from Bologna. On coming down the balloon caught in some high trees and took fire; to avoid being burned they leaped out, when Count Zambeccari was killed and his companion much injured.

In 1812 Mr. Sadler ascended at Dublin to cross to Liverpool, but meeting with an adverse current he resolved to descend into the sea. To escape from drowning, and effect the disablement of his balloon, he caused the crew of a ship to run her bowsprit through it, and then to take him on board. Mr. Windham Sadler, his son, ascended from the Green Park in the same year, and with difficulty saved his life. Not only did the valve become frozen, but the net burst at the top, and the silken covering of the balloon began gradually protruding through it. To save himself from being precipitated to the earth, he tied the long silken neck of the balloon round his body. After being carried to a great height into the upper regions, and almost frozen with the cold, he came down at length near Gravesend. In an ascent from Blackburn in 1824 by Mr. Windham Sadler, the balloon in descending struck against a chimney, and the aeronaut fell over the side of the car and was killed.

The most remarkable ascent in the early part of the century was, however, that fitted out by Mr. Holland, M.P. Mr. Green's balloon, afterwards known as the great *Nassau*, was employed for the expedition, and provided with every imaginable requisite, and provisions to last a fortnight, or longer if need be. On the afternoon of Monday, 7th November, 1836, it left Vauxhall Gardens. The party consisted of Mr. Green and Mr. Holland, the projector of the enterprise, accompanied by Mr. Monk Mason. It was one o'clock when they left the earth, and in obedience to the prevailing current they were wafted gently along. By the fading light of the winter day they found themselves leaving land, and vertically placed above the breakers on the beach beneath. Throughout the night, in utter darkness, they voyaged for hours above a dense stratum of cloud, through breaks in which an occasional glimmer of light from the fires on the surface of the earth alone could penetrate by a partial glimpse. As morning dawned the aspect of the country they were traversing afforded them no knowledge of their bearing, and at ten minutes past five they gained their greatest elevation, and

mounted to a height of 12,000 feet. At a quarter to six they were brought into full view of the sun, and presently descending, to rise again, enjoyed the spectacle of a sunrise above the clouds. As the sun gained power they anxiously endeavoured to gain some knowledge of the position they occupied above the earth; and in ignorance of the speed with which they had been journeying, and of the distance traversed, began to surmise that they might already have passed the limit of that part of Europe where they might expect to find the accommodation and conveniences necessary for their comfort and the safety of the balloon. The large tracts of snow beneath them suggested the plains of Poland or the steppes of Russia; they therefore proposed to descend without delay, and lowering the gnapnel, came safely to earth, passing the gentle declivity of a wooded valley, and descending into the bosom of the trees which capped its summit. Bespeaking the assistance of people near, the balloon was speedily secured, and they learned that they had descended in the duchy of Nassau, about 2 leagues from the town of Weilburg. The journey of over 500 miles had lasted eighteen hours, and was thus brought to a safe and agreeable termination. Mr. Monck Mason drew up an able account of the expedition, which he subsequently published in his "History of Aerostation," a work to which we refer those who may feel interested in further particulars of the voyage.

The career of Green, who conducted this expedition, began in the year 1821, at the coronation of George IV.; it continued for thirty-six years, during which he made nearly 1400 ascents. Twice he crossed the sea—once he fell into it. He obtained a large experience, and his accounts are worthy of all confidence, but unfortunately his education was not sufficiently good to make him a competent observer in the higher regions of the atmosphere. However, he improved the general management of balloons in many particulars; his guide-rope in aerial navigation, particularly of use in crossing seas, and the introduction of coal-gas in the place of hydrogen, are worthy of mention. He died in the year 1870, in his eighty-sixth year. In consequence of the employment of coal-gas, first introduced by him, the filling of a balloon is no longer the tedious and uncertain operation it was formerly, extending sometimes over several days, but is performed with ease and certainty in a few hours and at a moderate cost.

Mr. Henry Coxwell's career commenced in 1844, and after some years' experience as an observing amateur, when he frequently ascended with the leading aeronauts of that day, he commenced professionally in the year 1848 as the successor of Mr. Green. Being, however, a better educated man, and of an original as well as enterprising turn of mind, Mr. Coxwell, in the year 1845, projected and edited the *Aerostatic Magazine*. In the year 1849 he made a series of ascents on the Continent. He was with Albert Smith when a balloon (*Gypsous*) exploded over London at night, during a thunderstorm; and in the year 1859 Mr. Coxwell was the first to ascend from the Crystal Palace at Sydenham. This remarkable aeronaut comes of a good family. His grandfather resided at Abington House, and was deputy-lieutenant for the county of Gloucester, and magistrate; Commander Joseph Coxwell, R.N., was the balloonist's father; and Henry himself, although educated for the army, was for many years a surgeon-dentist. He was born on 2nd March, 1819, at the parsonage house at Wouldham, near Rochester Castle.

In 1863 Nadar, a Paris photographer, constructed a very large balloon—the largest gas-balloon, in fact, that had ever been made—capable of containing 200,000 cubic feet of gas, and called *Le Géant*. It had a car which was the model of a cottage in wickerwork, 8 feet high, 13 feet long, and containing two stories, divided into printing-office, photographic department, lavatory, &c. On its first ascent it took up thirteen persons, but an accident necessitated a

very early descent. The second ascent was from Paris, on 18th October, 1868, there being nine passengers, including Madame Nadar. In the course of seventeen hours the balloon was wafted a distance of 400 miles to Nienburg, in Hanover, and on descending was dragged over the ground a distance of 7 or 8 miles, to the serious injury of the aerial travellers. The balloon was afterwards brought to England and exhibited at the Crystal Palace, it being M. Nadar's object to raise enough money to carry out a plan of aerial navigation he had conceived possible by means of the screw. His idea, however, never came to anything.

In 1864 an attempt was made by M. Eugene Godard to revive Montgolfier's principle of "fire-balloons." M. Godard's construction was of an enormous size, such as had not been known since the one in which Montgolfier himself ascended in 1784. Its capacity was 500,000 cubic feet, the air for filling it being heated by an 18-feet stove, burning straw, and weighing with the chimney 980 lbs. The inflation on this principle occupies much less time than on any other, the whole immense capacity of M. Godard's machine being distended in an hour. The ascent was a very striking sight, the flames roaring up the chimney of the furnace into the enormous globe above. The trusses of compressed straw were suspended by ropes from the gallery below the car, and were drawn up and placed in the furnace as required. In one of the ascents made from Cremorne in 1864 M. Godard was accompanied by Colonel Burnaby, who has recorded that the sight of the "roaring fiery furnace" beneath the balloon was one little calculated to excite confidence in an intending voyager. In a rough descent, or with a strong wind, such a balloon could not be otherwise than most dangerous; the experiment was repeated at the Crystal Palace in the year 1868, but the balloon took fire and was destroyed.

In ballooning, as in most other matters, our American cousins go in for "big" things. They have accomplished the longest aerial voyage known—that of Mr. Wise in 1859, when he traversed a distance of 1120 miles; and they have made the biggest gas-balloon. This was one constructed with the rather large project of crossing the Atlantic from New York to Europe. Its capacity was 400,000 cubic feet, and the proposed voyage would perhaps have been attempted in 1873 but for an accident. When 325,000 feet of gas had been put into the balloon a rent occurred, and the whole rapidly collapsed. The journey over the Atlantic was considered possible because it was thought a current from west to east existed constantly at heights above 10,000 feet. Mr. Green was stated to have met with such a current, but the experience of Mr. Coxwell, Mr. Glaisher, and the numerous Paris balloonists of 1870–71 goes to show that no constant current exists, but that at any height the wind is as capricious as near the ground. Much skill and daring has been shown by Mr. Wise in the several hundred ascents he has made, and his "History of Aerostation" shows him to possess high scientific attainments; but competent judges do not regard as reliable many of the long voyages recorded to have taken place in America.

Scientific Ballooning.—Soon after the discovery of the balloon a desire arose for experiments in the higher regions of the air. The first experiments, as previously stated, were made at St. Petersburg, by command of the Emperor of Russia, by Mr. Robertson, in the years 1803 and 1804, but no important results were obtained. In the latter year two experiments were made at Paris, the first on 31st August, by Gay-Lussac and Biot. These gentlemen ascended to the height of 13,000 feet, but did not commence their observations till they were 7000 feet high. Their experiments in magnetism, electricity, or galvanism gave results identical with those made on the earth—a source of much disappointment to every one.

It was then supposed that they had not ascended high

enough, and Gay-Lussac resolved to go alone, with the view of reaching a greater elevation. This he succeeded in doing on the 15th of September following, when he reached a height of 23,000 feet, and found a decline of temperature from 82° to 15° , almost confirming the theory of a decline of temperature of 1° in 300 feet of elevation. The sky was very blue, and the air was found to be very dry. A magnet took a longer time to vibrate than on the earth. He filled two bottles with air from the higher regions, which on analysis was found to be in its component parts the same as the lower air.

Two years after this the astronomer-royal of Naples, Carlo Brioschi, wished to ascend higher than Gay-Lussac, but this he was unable to do in consequence of the balloon bursting. After this no attempt was made till the year 1843, when the British Association appointed a committee and voted a sum of money for experiments by means of captive balloons. Several committees were subsequently appointed, and out of the limited resources of the association considerable sums of money were granted for experiments by means of balloons, but no important practical results were obtained.

In the year 1852 Mr. Welsh, of the Kew Observatory, under the auspices of the British Association, made four ascents in the great *Nassau* balloon, with the veteran aeronaut Mr. Green, who had then an experience derived from several hundred ascents. In August, October, and November he reached the respective heights of 19,500, 19,100, 12,610, and 22,330 feet, and in each ascent made a valuable series of observations.

In 1862 Mr. James Glaisher, also by arrangement with the British Association, commenced a series of ascents, every one of which was productive of useful observations relating to atmospheric phenomena, electric and magnetic, hygrometric and thermometric, photometric and actinic. His principal object, in accordance with the desire of the association, was to verify the law of the decrease of temperature as found from summer-day observations, already made, with day observations at other seasons of the year, but principally in the winter and adjacent months; to make, as far as possible, magnetic experiments, spectroscopic observations, and records of facts relating to aerial currents, solar radiation at different heights, and moisture; and finally, to make observations at night. To carry out this last-named purpose Mr. Glaisher caused two excellent safety-lamps to be made for him that would give light enough to read off observations without endangering the balloon or its appendages. As the night ascents were more valuable than the day, so were the winter ascents than those made in summer—because they filled up a scientific gap, and their fruitful results have already made themselves apparent in various ways. Amongst other things, it has been clearly proved that the decrease of temperature is much more rapid near the earth, and much slower at greater elevations, than had before been theoretically supposed. In nearly all his ascents Mr. Glaisher ascended in Mr. Coxwell's large balloon, which that aeronaut had specially and liberally constructed himself, and at his own cost. In fact it was mainly owing to the latter's skill and experience in managing the balloon that the scientific experiments were so successful. The two aeronauts repeatedly ascended to the zone of life-destroying cold—far above our highest mountain tops—and in one ascent they reached the extraordinary height of 7 miles. It was on this occasion that at over $5\frac{1}{2}$ miles high Mr. Glaisher became insensible and Mr. Coxwell lost the use of his hands, but he was fortunately able to open the valve with his teeth, and they were thus enabled to descend in safety.

The Aeronautical Society of Great Britain was founded in 1866. A chief branch of inquiry by the society is the department relating to the mechanical expedients and inventions for facilitating aerial navigation, and obtaining

or aiding a change of locality at the will of the aeronaut. Mr. Coxwell, writing in 1877, stated that "most of the designs for guiding balloons and for flying, sketched out within the last thirty years, have been submitted to me. The best of them are, so far as I can judge, destitute of the required motive power. This difficulty has not, I believe, been overcome by the suggested application of steam power or manual labour to set in motion paddles, wings, sails, screws, or to co-operate with inclined planes or any sustaining power in imitation of birds. A sufficiently light and powerful motor is yet wanting."

In 1880 another society, called the Balloon Society, offered a prize for aeronautical competition, to be awarded to the balloonist who not only made the longest voyage in a given time, but whose meteorological and other observations should be the most valuable. Five competitors ascended on the 6th of September, and the voyages of each were considered of such good and equal merit that five prizes were given instead of one. A proposal made in the same year to reach the North Pole by balloons appeared so utterly impracticable that an appeal for public subscriptions met with the most scanty response.

Balloons in War.—The first actual application of a balloon to any military purpose occurred at Valenciennes, in 1793, and resulted in failure. The garrison, sorely pressed by the English and allied armies, despatched a small parachute (to which was attached a letter addressed to the National Assembly), with a fair breeze blowing towards Paris. About evening the wind changed round, and the balloon fell in the camp of the allies.

About this time a scientific commission had been deputed by the committee of public safety to inquire into various improvements in war matériel. Among its members was Guyton de Morveau, who had already made several successful balloon ascents in various parts of France. By him the question of aerostation was brought before the commission, and admitted for consideration. Some successful experiments in the manufacture of hydrogen gas without sulphur were made in Paris by a young captain of engineers, named Contelle, and it was then considered advisable to take the opinion of Jourdan, who had lately succeeded Bonchard in the command of the armies of the north, on the military bearings of the question. After an interview with Contelle, Jourdan heartily approved of it, and the result was that in 1794 an aerostatic institute was organized at Meudon to train a corps of *aerostiers*: men whose business it would be to ascend to a certain height in captive balloons, watch the movements of the enemy in a field of battle or in a besieged fort, and send down signals to the French commander. At the battle of Fleurus in that year, M. de Morveau and Captain Contelle went up with a balloon, the one to manage it, the other to make military observations, and to send down military information. They remained up four hours (near Charleroi), keeping at a definite height of 1000 feet or more, secured by a rope fastened to the ground. They ascended twice, watched the movements of the Austrian army, and sent down signals which assisted General Jourdan in winning the day. The Austrians fired up some great guns at the balloon, but failed to get the range. During the siege of Metz, in 1870, this celebrated balloon, which had served the French so well seventy-seven years before, was discovered in the archives of the war department in the town, and it suggested the attempt to communicate with the provinces over the Prussian lines. Some aerial voyages were made, principally conveying letters from the beleaguered town and garrison.

At the coronation fêtes of Napoleon I. a fire-balloon sent up from the Place de la Concorde in Paris, with the imperial cipher and crown attached, fell early the next morning at Rome, where the crown caught in, and remained fastened to, the tomb of Nero (or at least to the building

commonly designated as such), whilst the casing of the balloon and the netting fell into Lake Bratiano. The crown of Napoleon I. hooking itself on to the tomb of Nero did not escape the caricaturists of the period, and pen and pencil were so mercilessly plied that in spite of the valuable services which the balloon corps had already rendered, and of the future uses to which it might be put, Napoleon I., who, on the first receipt of the intelligence, had manifested much ill-humour, decreed its abolition.

The advocacy of balloons for warfare was repeated by Mr. Coxwell, who in the year 1854 made a typical "war balloon," having semaphore arms and signals which worked from the hoop above the car. With these he first showed the use of balloon signals in England.

From this period balloons were not again used for war-like purposes until 1859, when observations were made by the French to ascertain the position of the Austrian armies. Early in the American war General McClellan had a balloon corps attached to his army, and during the bombardment of Charleston, in 1862, three officers ascended in a balloon and made observations which greatly facilitated the work of the besiegers. Two balloons also accompanied General McClellan's army when engaged in the campaign of the Yorktown peninsula. One was sent up every evening when his troops were employed in besieging Yorktown, and subsequently when the Confederates retreated towards Richmond. They were also used during the time that he was encamped on the Chickahominy prior to his retreat on the James River, when they fell into the enemy's hands. But little useful information was obtained from these balloons. The wooded character of the country concealed the movements and position of the troops; the roads through the forests were almost entirely hidden from a bird's-eye view by the overhanging branches of the trees; and the earthworks, seen as on a plan, presented apparently flat surfaces, which the colour of the newly-turned earth only rendered distinguishable. The information obtained, although frequently startling, was seldom trustworthy.

In the years 1868-64 Mr. Coxwell made experimental military ascents at Woolwich Arsenal and Aldershot Camp. During a sham fight, in which the Duke of Cambridge was present, several distinguished officers ascended in the captive balloon, and ultimately Mr. Coxwell was accompanied by Captain (now Colonel) F. Beaumont, who had some experience in America.

In the Franco-German war of 1870-71 Mr. Coxwell taught the use of military balloons at Cologne, but during the siege of Paris few balloons were more extensively used by the French than they had ever been before. Soon after the capital became thoroughly invested by the Germans, in September the bureaux of the post-office were overflowing with correspondence for the departments, which there did not seem the slightest chance of despatching. In this state of affairs Nadar, the well-known photographer and aeronaut, turned his attention towards inaugurating a system of postal balloons, and an experimental one having answered well, the government entered into a contract with him for their regular despatch. Two railway stations were turned into factories for the manufacture of balloons, which were made not of silk, but of calico, and this being covered with two or three coats of a varnish of linseed-oil and oxide of lead, was found to answer equally well. The average size of the balloons was 70,000 to 72,000 cubic feet. The aeronauts employed were mostly sailors, who did their work most satisfactorily, and enabled the balloon to play an exceedingly important part in this great siege. It was by it alone that communication was kept up between the besieged city and the external world, as the balloons carried away from Paris the pigeons which afterwards brought back to it the news from the provinces. The total number of balloons that ascended from Paris during the siege, conveying persons and despatches, was sixty-four each carrying on the

average two passengers, from 4 to 6 cwt. of letters, and two pigeons. The first to leave was the *Neptune*, on 23rd September, 1870, freighted, amongst other things, with accounts of M. Jules Favre's report of his interview with Count Bismarck at Ferrières. M. Gambetta effected his escape on 7th October by the *Armand-Barbès*, and there is no doubt that these two balloons, by giving to France the now historical declaration of M. Favre and the fiery eloquence of M. Gambetta, tended most powerfully to prolong the war. Of the sixty-four balloons only two were never heard of, having been blown out to sea. One of the most remarkable voyages was that of the *Ville d'Orléans*, which, leaving Paris at eleven o'clock on 21st November, descended fifteen hours afterwards near Christiania, having crossed the North Sea. Several of the balloons on their descent were taken by the Germans, and many of them were fired at while in the air, but none were injured from this cause.

In 1881 Mr. Powell, M.P., lost his life in an unsuccessful attempt to land from a military balloon, being carried out to sea and never again heard of. Several attempts were made to cross the channel to France, and ultimately Colonel Burnaby, and afterwards Mr. Simmons also, succeeded—though, as the same experiment was successfully performed about 100 years before, its novelty is not very apparent. Various other ascents of the same nature have been made, with the idea of so calculating the direction and strength of the wind as to insure reaching a predetermined spot in a given time. The more practical intention which the army authorities have in view in carrying out their extensive balloon practice of late years, seems to be to accustom men to make observations from great heights. Accuracy in such observations, from positions in which at first a downward look causes the brain to reel, is only attained by practice. The information obtainable from a balloon may be of the utmost value, but not if the experiment is made with the enemy's bullets flying around an amateur aeronaut on his first aerial trip. During the Egyptian campaign in 1882 arrangements were made for the despatch of a balloon corps, but its operations were rendered unnecessary by the surprisingly rapid and complete success which attended the tactics of the British commander.

A parachute is a machine attached to a balloon, and is intended to convey the aeronaut gently to the earth, in case of an accident happening to the balloon. It is in shape like an umbrella, with ropes or stays fastened to the extremities of the galehones, and brought down to the handle, where they must be fixed, so as to prevent the umbrella from turning inside outwards. Instead of the stick, suppose a metal tube to be fixed in the centre, with a rope passing through it, attached by its upper extremity to the balloon, and by its lower end to a tub or car. This machine is a parachute. While ascending, it will be like a closed umbrella, but it may at any moment be detached from the balloon by cutting the end of the rope which ties it to the car; the resistance of the air will then cause it to expand, and will at the same time retard the velocity of descent. (See Plate I., figs. 5 and 6.)

Machines like umbrellas, to break the fall from a high place, were used in Siam two centuries since; but the first experiment in Europe with such a machine was made at Paris in 1783 by M. le Normand, who leaped safely from a window of a house with a stout umbrella of 30 inches in diameter in his hand. M. Blanchard several times caused dogs to descend from great heights by means of parachutes; and in 1802 M. Garnerin, who five years before had made a like descent at Paris, repeated the experiment in London. The parachute of this gentleman was 23 feet in diameter; and at the height of 8000 feet he cut the rope which attached him to the balloon. The descent was at first very rapid; but, the machine at length expanding, he came to the ground without serious injury. Miss Garnerin, his

daughter, descended twice in 1816 from great elevations, apparently without being in the least decomposed.

In 1837 Mr. Cocking descended near London from a balloon, by a parachute constructed in the form of an umbrella open and turned upside down. The parachute was 34 feet in diameter, and it was kept open by a hoop of hollow copper or tin. The machine was taken up suspended from Mr. Green's *Nassau* balloon, and was liberated by Cocking when nearly over Greenwich, a height of 5000 feet. The parachute for a few seconds descended very rapidly but still evenly, until suddenly the upper rim seemed to give way, and the whole apparatus collapsed (taking a form resembling an umbrella turned inside out and nearly closed), and descended rapidly with violent oscillations. Mr. Cocking was found in a field at Lee literally dashed to pieces. The releasing of so considerable a weight (altogether 400 lbs.) from the balloon, caused the latter to shoot upwards with most dangerous rapidity; and but for the precaution they had taken of having with them large bags of atmospheric air, to which they applied their mouths, both Mr. Green and his companion would have been suffocated by the outrush of gas from the mouth of the balloon. In the year 1838 Mr. Hampton descended in a parachute from Cheltenham, and subsequently from Cremorne Gardens. M. Lefure of Paris also attempted a descent in the year 1851, but he was injured in being dragged through some trees at Tottenham, and died soon afterwards. He had, however, succeeded twice or thrice previously.

Balloon Signalling.—Nearly a year before the Egyptian campaign Mr. Coxwell called the attention of military and scientific men at the Crystal Palace, Sydenham, to his new plan of employing a reconnoitring balloon and two smaller ones to illustrate his system of signalling. The object in having two or three balloons working together was that they should be the means of signalling intelligence in preference to semaphore arms, flags, or other devices attached to the ear. For warfare, and for meteorological and maritime purposes as well, they can be seen at long distances, and can be used in a captive state, that is, let up by ropes to any altitude required, which would prove specially applicable where telegraphic wires could not be laid, and also where, for want of sunshine, the heliograph could not flash news. A few extracts from Mr. Coxwell's letters to the *Times* will further explain his views, which might have been practically tested in the East during Sir Garnet Wolseley's operations in Egypt had not the balloon expedition from the arsenal been too long delayed. Mr. Coxwell had personally offered to give the use of his own balloons, so as to co-operate with those which were at Woolwich for military equipment.

So early as 9th September, 1881, the newspapers stated that "during the past week experiments with Mr. Coxwell's balloons for signalling had been frequent and successful. The twin balloons, and indeed the trio, had ascended in the vicinity of the North Tower of the Crystal Palace, hovering in their tethered state around and above that building at an altitude of 500 feet." Again, on the 22nd of September, 1881, "Balloon signalling in a breeze" is ably described. This took place notwithstanding the prevalence of fresh and variable winds, when the signal balloons were held at their moorings and subjected to a severe strain, which established the aeronaut's theory. "The captives certainly rolled somewhat like a ship in a heavy swell, but the relative positions were maintained, and the ropes held firm, so that all doubts and prophetic warnings as to a smash and escape were dispelled."

Briefly summarized the principle is simply this. The larger reconnoitring balloon capable of raising observers is, like our sun, the central orb, and is always in the middle; the two smaller balloons, as illustrated in Plate II., are made to assume a variety of positions, and act as satellites to a planet, and can be made, by revolving round the

larger balloon at the equator, poles, and different angles to signify any one of the code of signals agreed upon. This is easily managed by parties holding the retaining ropes of the satellites moving round the reconnoitring balloon, or by slackening out or hauling down below it from stations on the ground.

A few leading variations such as we depict are clearly susceptible of addition and multiplication, so that signal No. 1 added to signal No. 6, for example, means signal 16, and will convey, according to the prearranged key, any information agreed upon; and so on indefinitely. The twin balloons, either detached or united by a spar, can be used without the reconnoitring balloon, and will signal by dot and dash or by dip and revolving.

They can be used separately by night, or in combination, with coloured pyrotechnic lights or with electric lamps, the requisite appendage of wire and motor being on the earth.

Mr. Coxwell considers that for military and other uses aerial signalling should be large, distinct, and capable of quick change, both as regards elevation and locality. Miniature free balloons form part of his system, but these would soon be lost to view, and are not so reliable as captives.

Words can be spelt alphabetically, if need be, by letters corresponding with the numbers.

Dirigible Balloons.—The balloon still remains pretty nearly what it was—most effective in its primitive form, viz. an envelope filled with a light gas, committed to the influence of any aerial current which may be deemed favourable to the end in view. All attempts have failed to propel it so as effectively to bridle it for locomotion.

Experiments by MM. Giffard and De Lôme have proved it to be possible only under certain conditions, which, however, as they can never be depended upon, seem to render all attempts hopeless as regards the attainment of any commercially valuable results. M. Giffard's balloon, or elongated aerostat, was 44 metres long by 12 metres in diameter at its broadest part. Its inventor made use of steam for the first time in aeronautics, taking the precaution to turn the chimney downwards, and effecting the draft by a steam blast. The engine was of 3 H.P., and worked a two-bladed screw 3.4 metres in diameter, to which could be imparted 110 revolutions per minute. He ascended from Paris on the 24th September, 1852. After having attained a desirable height the engine was started, and it is upon record that by his screws he got a velocity of from $4\frac{1}{2}$ to $6\frac{1}{2}$ miles an hour.

It is matter of history now how useful became the balloon in the siege of Paris. Then, if ever, it was a necessity that some independent motion should be given to the balloon, however small; and to this end the cost was but a small matter in proportion to the possible results, viz. the return to Paris. As Paris was the centre of a circle of investment of about 20 miles diameter, it was possible that, starting with a favourable wind, such a balloon might have succeeded in descending somewhere within that circle.

Accordingly the French naval architect M. Dupuy de Lôme set about constructing such a machine. The form of the balloon was oval, its diameter being about two-fifths of its horizontal length.

Total length from end to end,	118 ft. 6 in.
Diameter at the point of greatest circumference,	49 ft. 2 in.
Diameter of screw,	29 ft. 6 in.
Pitch of screw,	26 ft. 8 in.
Number of blades,	2.

Owing to unavoidable delays, the balloon was not finished until just four days before the capitulation of Paris. Then came the Commune and all the disorganization which followed it, and it was not until the 2nd February, 1872, that M. De Lôme was able to ascend on a trial trip from Fort Neuf, at Vincennes.

Careful observations were made during this voyage. It was found that when eight men were working together at the screw, giving it $27\frac{1}{2}$ revolutions per minute, an independent velocity was obtained of 2.82 metres per second, or about 6.3 miles per hour. The slip of the screw was found to be 24 per cent. By the use of the rudder, it was said that the course of the balloon could be altered 11° either way, making a total deviation of 22° from the set of the wind, which in this instance was reported to be blowing half a gale.

Since then researches have been made in connection with electricity, and in 1884 the aeronauts of Europe were startled by the report that these experiments had been attended with success. At the balloon works of Mendon, belonging to the French government, an elliptical balloon, carrying an electric motor, a screw propeller, and a rudder, was said to have been navigated for 7 miles against the wind, and to have been brought back to the place of starting. The details of the mechanism employed, however, have been disclosed only to the French War Office, and until the experiments have been repeated upon a more extended scale it is only reasonable to receive the account with caution.

Aerial Machines independent of Gas.—A new era will date from the invention, by M. A. Penaud, of the French Aeronautical Society, of a simple method of giving a reciprocal action to wings, by means of the recoil of twisted india-rubber bands. Experiments as to the efficacy of wing action have resulted therefrom, which have convinced many experimenters of the value of such reciprocal action for the attainment of flight by man.

M. Penaud first applied his new motive power to a helicopter, or vertical screw, which is represented in fig. 1, Plate III. This model was constructed and shown to the French Society in 1870. It consists of two screws superposed, turning in contrary directions, their distance apart being maintained by two strips of wood, between which is placed the india-rubber. One end of the rubber is attached to the frame which carries the two short wings, fixed screw shape, and thus turns them by reaction after the strands are twisted to a great state of tension. The other end is fastened to a hook at the extremity of the shaft. The hook is fixed in the centre of two wings, also acting in the manner of a screw, thus causing the lower wings to revolve in a contrary direction to the upper ones. When the rubber is sufficiently twisted, it is only necessary to abandon the apparatus to itself. It will then (according to the proportion of screw area to weight) rise like an arrow to the height of 50 feet or more, or will glide obliquely, or describe large circles.

M. Penaud now applied his mechanical arrangement to an aero-plane. Sir George Cayley, in 1810, had proposed the application of the screw to a slightly inclined plane. Henson patented and constructed a model on the same principle. Stringfellow attached a steam engine to a model having two fixed wings or planes 10 feet from tip to tip, and 2 feet across at the widest part—sustaining surface, 17 square feet. The propellers were 16 inches in length, with four blades set at an angle of 60° . The weight of the entire model and engine, with water and fuel, did not exceed $6\frac{1}{2}$ lbs. He succeeded in making it fly about 40 yards.

Such complicated models, however, preclude continuous experiment, so that the simple arrangement which M. Penaud was able to construct was more satisfactory, from the fact that a breakage was not a matter of importance. The arrangement consists of a rod which constitutes the main frame. To its fore end is attached a small hook and to the back one a bearing for the screw axle, which is also terminated by a hook. Between these hooks the rubber is stretched. In fig. 2, Plate III., the screw is shown at the back of the machine, but it has been placed in the front with equal success. About the centre of the rod is placed the sustaining planes, which are made to slide along it to any

position. The angle of either plane can be altered at will. Some models have been fitted with two screws working in contrary directions, but this is not necessary—in fact, is only a complication, which was adopted because of the tendency which the action of one screw had to turn the model over sideways. This is, however, easily preventable by adding a weight at the extremity of one wing to counteract this tendency. The lateral balance is maintained either by turning up the ends of the wings or by fixing the wings upon the rod at an upward angle. Some of the large models have been capable of sustaining flight to the extent of 200 feet, which has been performed in twenty seconds. M. Penaud, whose death took place in 1881, has given it as his opinion, formed from a long course of experiments with screw-propelled planes, that 1 horse power would support about 85 lbs.

In an annual report of the Aeronautical Society of Great Britain it is stated that in the latter part of 1871 M. Penaud and Dr. Hureau de Villeneuve, the hon. secretary of the French Society, began to make experiments with mechanical birds, whose wings were actuated by the twisted strands of india-rubber. Dr. de Villeneuve's theory of flight was altogether different from that of M. Penaud, yet both succeeded in achieving it. The former, after making elaborate researches into the movements of the shoulder-bone of the bat, took it for his model. In his bird the axis of rotation of the wings is oblique, the wings striking downwards and forwards. These wings, which are nearly rigid, have a conical movement given to them, and the changes in the angle of inclination of their surfaces are entirely due to this movement. In M. Penaud's wings the changes in the inclination of the surface are obtained by the elasticity of the sail or back part of the wing. Rubber springs run from the back inner edge of the wings to the centre of the rod which forms the main frame. The torsion and changes in the inclination of the wings are thus regulated by the combined action of the pressure of the air and these springs. When the wing is in its highest position, at the end of the upstroke, the rubber springs before mentioned cause it to present its inferior surface forward at an inclination of 15° . Upon the descent of the wing the resistance of the air causes its outer portion to twist into a screw shape, the back edge being higher than the front, and thus supports and propels. The inner portion of the wing always remains inclined upwards, and acts like a kite. It is thus divided into two parts—one active and the other passive; the outer, which comprises two-thirds of the wing, both supporting and propelling, while the inner only supports.

Fig. 3, Plate III., is a view of M. Penaud's model. It was unable to rise from the ground, and would only fly upon being thrown from the hand. On the contrary, Dr. de Villeneuve's model, owing to the peculiar action of the wings, was able to start directly from the ground; but owing to the small number of strokes which he was able to give it, it could not fly above 24 feet. Flight has, therefore, been shown on three different principles.

About the time that these experiments were being carried on in France, a trial upon a large scale was taking place at the Crystal Palace. But inasmuch as the dimensions were not calculated upon a scale to sustain a weight equal to a man, the machine can only be ranked amongst the models. The effect was capable of being tried upon a very much smaller scale, in neglect of which some hundreds of pounds were expended unnecessarily.

As will be seen by the engraving, fig. 1, Plate IV., the idea was to propel the machine in the air by the action of two wheels, each 6 feet in diameter, having each six planes which performed the part of screw propellers, but their pitch was variable at every portion of the revolution. Its inventor, Mr. Thomas Moy, thought that the action of these planes in their revolution through the air would be a perfect imitation

of the action of a bird's wing in the various positions that its surface assumes during the progress of flight. These screw planes were supposed, therefore, to take a support upon the air as well as to propel, but in addition there was a plane of 50 square feet of tightly-stretched linen fitted in front at an angle of 10° , and one of 64 square feet behind.

The steam engine designed by him for revolving the aero-plane wheels was of 3 horse power, and was contained in a case 27 inches by $27\frac{1}{2}$ by $7\frac{1}{2}$, inclusive of the generating tubes, which exposed a heating surface of 8 square feet. The fuel was methylated spirits under pressure. The engine weighed 80 lbs., and was placed between the two wheels.

The whole weight of the machine was 214 lbs., and the bearing surface, upon the supposition that the revolving planes were effective, was calculated to be 174 square feet, or about $1\frac{1}{4}$ lb. to each square foot. A speed of 35 miles an hour was required to get such a hold upon the air as to effect its leaving the ground. Accordingly, the circle round the great fountain at the Crystal Palace was boarded over. This gave a circle whose diameter is 300 feet. A restraining rope fixed to the centre of the fountain maintained the machine in its position. The whole machine stood upon three small wheels, quite disproportioned to the size, and moreover they were made to go straight forward, and not to turn in a circle. Notwithstanding these disadvantages this machine, by the action of the aero-plane wheels, attained a velocity of about 12 miles an hour -- of course, wholly inadequate to achieve any visible lifting effect. Yet this was a most valuable experiment, as teaching future inventors what to avoid.

Mr. Fred. W. Brearey seems to have taken advantage of this experience in his design for the accomplishment of aerial navigation. He has been the honorary secretary of the Aeronautical Society of Great Britain ever since its establishment in 1866. In the course of his experiments, extending over some years, he found that if a serpentine action were imparted to a fabric it would propel an attached object many times its weight in the air. He records in his published magazine articles that he took the idea from watching the movements of a skate in an aquarium, which in swimming undulated its whole body.

In applying the principle to locomotion in air it is of course impossible to undulate what may be called the backbone of the whole structure in the manner of the skate. But a fabric may be so attached to a receptacle, and so worked from thence by a suitable motive power, that its undulations will propel and support a considerable weight, depending upon the energy with which such fabric is thrown into waves. He believes that the sailing of a vessel can be made in this way to contribute to a ship's progress at the same time that it would cool the passengers.

Mr. Brearey argues that the instinct of the bird enables it to adapt itself instantaneously to varying circumstances; that in any arrangement for effecting flight by machinery -- the adjustment of parts to meet sudden requirements being a matter requiring momentary thought -- it is desirable, if practicable, to employ large surfaces for parachute action, at the same time making this means of safety not an incumbrance but an aid. The possession of instinct allows of the employment of the smallest surface in proportion to weight; the possession of forethought renders it necessary that intermittent action shall be safeguarded by large surfaces.

This requirement is fully met, the inventor says, by the arrangement advocated by him, and none but edge resistance is offered to the air, except the sharp lines of the necessary vehicle. The manufacture of such an apparatus upon a scale of utility would be as follows:--

A flat-bottomed receptacle, somewhat of boat shape, would be fixed upon wheels. At the fore part of the boat a motor would from each side elevate and depress two

wing-arms, each 15 feet long. (See fig. 2, Plate IV.) Along the wing-arms is attached a fabric which would form the front part of a kite, which, being fastened in the centre to the edge of the boat, would continue for 15 feet to the rear, being extended about 6 feet further than the stern of the boat by a continuing spar. To a cross piece here would be fastened the tail end of the kite, which, however, instead of a point, would be about 5 feet in width. From this again would extend a tail of about 12 feet, to which either a lateral, twisting, or a vertical movement could be imparted by cords in the hands of the operator in the boat for steering purposes. From the fore part of the boat would extend a bowsprit, from which cords would be attached to the two wing-arms to prevent the weight of the fabric from dragging them backwards.

An important arrangement has been adopted by the inventor, which he calls the pectoral cord, which by its automatic action assumes the functions of the pectoral muscle of the bird. This is an india-rubber cord. It is attached by its two extremities to the under portion of each wing-arm, and in models passes underneath a central shaft -- in this case the boat. Its degree of elasticity is regulated by the weight. When any model with wings is committed to the action of the air, the pressure of the air causes the wings to fly upwards, and power is required according to the weight sustained to depress the wings against the weight. The strength of the cord, however, such that it maintains the outstretched wings at that angle which is suitable for gliding upon the air without -- the case of the bird, any enforced muscular exertion. The contraction of this cord assists the power exerted in the downward stroke.

The wing-arms would not be rigid throughout their length. They would consist of a number of rattans or canes firmly bound together by close wrapping, and tapered by cutting off one at intervals, thus being practically unbreakable by any accident likely to occur. The portion next to the body for 5 or 6 feet might be stiffened by a steel tube, forming the centre round which the rattans are wrapped. By this method of forming the wing-arms their length may be increased at pleasure.

A small model upon this principle, but without any motive power, was liberated as an experiment by Captain Templer, from a balloon which had risen 200 or 300 feet from Woolwich Arsenal, and it travelled back again to the arsenal half a mile against the wind uninjured.

The importance of such an apparatus might become manifest in any flight of a balloon from a besieged place over the heads of an investing army. The results of a rapid survey of the enemy's positions could be written and despatched from a height against the same current which wafted the balloon, so as to fall within the lines of the besieged.

Given a light motive power, which it is hoped may soon be forthcoming, Mr. Brearey anticipates the action of the machine as follows:--

A surface will be provided according to the weight to be carried, the supporting surface of a parachute being known. Upon being run down an incline the envelope will be inflated by the pressure of the air, and the wing-arms raised to that point where their further elevation is restrained by the pectoral cord. The machine will then naturally float away from the incline, and the occupant must set his motor in action. The downward blow of the wing-arms will cause the fabric immediately attached thereto to imprison a mass of compressed air, and the following wave will force it along the under side of the fabric. This will cause propulsion.

The return or up stroke cuts off and diverts from the upper part that air which, but for the rise of the wing-arms, would flow over the back, and shunts it underneath, whilst that which is embraced in the concave fabric

following the up-stroke is thrown off in a wave to the rear above the machine, and so on alternately.

During this energetic action the whole fabric is kept in a state of corrugation, and to such extent is rigid. It possesses all the properties of a plane, and superiority over a plane inasmuch as it propels itself, and upon cessation of action assumes the functions of a parachute, the descent of which a man may regulate by a step backward or forward.

The latest invention which has been completed upon a full scale is the idea of Mr. H. C. Linfield of Margate. It is really a plane-propelling machine, but the planes are compressed, it may be said, into small compass, being only 2 inches apart, and being of such number and extent as to present 438 square feet of strained and varnished linen in two frames, each 5 feet square. The dimensions of the machine are 20 feet 9 inches in length, 15 feet in width, and 8 feet 3 inches in height. It runs upon four wheels; the two front wheels are 6 feet in diameter, the two hinder wheels 3 feet. The frames before mentioned are fixed one on each outer side of the front wheel at an upward angle. The wheels have been tested to sustain a weight of 5 cwt.

The weight of the machine is 240 lbs., and of its inventor 180 lbs. He sits between the wheels and works two treadles, which actuate a nine-bladed screw 7 feet in diameter, fixed in front of the machine, to which he can impart 112 revolutions per minute. This suffices to enable him to travel along a level road.

Those who wish to know more on this subject are referred to a work called "Aerial Navigation," by Charles Blackford Mansfield, published in 1877 by Macmillan & Co., but written about twenty-five years previously.

BAL'LOT, a word taken from the French *ballotte*, signifying a little ball, and used to designate a mode of voting employed upon occasions when it is considered desirable to preserve secrecy in regard to the opinion of each voter.

The modes of voting by ballot are various, but the principle is the same. The voter puts into a box a black ball or white ball, as he pleases, and the box is so contrived, or intended to be so contrived, that no person shall know which colour he has put in. Or the name or names of the person or persons for whom a man votes are written or printed on paper, and the voter places the paper folded up, so as to conceal the names, in a locked box which has a suitable aperture for the reception of the papers. The result is ascertained by counting the balls or papers. This mode of election is now almost universally used in England by clubs and scientific societies. The directors of the Bank of England are also thus chosen.

In France the ballot is used in the election of members of the Chamber of Deputies, and the same mode of voting is frequently resorted to in the deliberations of the legislative chambers. In the United States of America and in the Australian colonies almost all public elections are conducted by ballot, and the principle was first publicly adopted in England in the election of the school boards in 1870. In 1872 an Act was passed by which ballot was applied to parliamentary and municipal elections in the United Kingdom. The procedure in these cases is now as follows:—The intending voter, having been identified as properly qualified according to the register, is furnished with a ballot paper showing the names of the candidates, with a number printed on the back, and having attached to it a counterfoil with the same number printed on the face. At the time of voting the ballot paper is marked on both sides with an official mark, and delivered to the voter within the polling station, the number of such voter on the register being at the same time marked on the counterfoil. The voter having secretly marked his vote on the paper, and folded it up so as to conceal his vote, places it in a closed box, in the presence of the officer presiding at the

polling station, after having shown to him the official mark at the back. At the close of the poll the ballot boxes are sealed up, so as to prevent the introduction of additional ballot papers, and are taken charge of by the returning officer, who at the proper time, and in the presence of the agents of the candidates, opens the boxes and ascertains the result of the poll by counting the votes given to each candidate. There is thus the means of preserving complete secrecy as to how electors record their votes; and the Act contains stringent regulations, backed by severe penalties, to prevent personation, or any kind of tampering with the boxes or papers, either on the part of voters or officials.

BAL'Y, BALI, or LITTLE JAVA, an island separated from the eastern extremity of Java by the Straits of Bally. It is situated between the eighth and ninth degrees of S. lat., its southern promontory being in 8° 40' S. lat., and 115° 20' E. lon. The island is 70 miles long from E. to W., and its average breadth is 35 miles. The Strait of Bally is very narrow in some parts; the spring tides pass through it at the rate of 6 miles an hour. The coast is difficult of approach. The country is mountainous, the centre being traversed by a lofty volcanic chain, of which the highest summit is 11,300 feet. The climate and soil are similar to those of Java. The chief vegetable productions of Bally are rice, maize, sweet potatoes, tobacco, and cotton. Coffee is also grown in large quantities. Oxen for draught, cattle, and swine are numerous. The external trade is almost entirely carried on by Chinese. The island is divided into eight independent states, each of which is governed by a rajah, but the Dutch claim a sovereignty over all. The harbour of Bali-Budong, which is visited by Dutch vessels, is on the south side of the island. The population of the whole island has been variously estimated at from 600,000 and 800,000. The Balinese are a finer race of men than the Javans, and are indeed superior in stature and muscular strength to the generality of Eastern islanders. Since 1845 the Dutch have had a permanent settlement at Budong, and their influence over the island was considerably extended in consequence of a war waged with the natives in 1847–49.

BALLYCAS'TLE, a town of Ireland, is situated on the north coast of the county of Antrim, on a bay to which it gives name, 42 miles N. by W. of Belfast. It originated in a castle built here by the Earl of Antrim in the early part of the reign of James I., but was not remarkable as a town until about 1770, when large parliamentary grants were voted to aid the working of the collieries in its neighbourhood. The workings, after having been carried on for a number of years to a considerable extent, were relinquished. The town lies in a beautiful valley in the inner extremity of the bay, and consists of two detached portions, the upper and lower towns, connected by a fine avenue. The population in 1881 was 1932.

BALLYMENA, a town of Ireland, in the county of Antrim, is situated near the centre of a plain, on the Braid rivulet, which mingles with the Main, 2 miles below the town. It is about 18 miles N. by W. from Belfast, on the Belfast and Northern Counties Railway. The linen trade, which was introduced in 1733, is carried on extensively; the sale of brown linens alone amounts to £1,000,000 per annum. The town is well built, and has altogether a thriving appearance. There are a church and several chapels and schools, a market-house, and several branch banks. The population in 1881 was 8883. The town was taken by the insurgents in 1798, after a sharp engagement, but was almost immediately evacuated.

BALLYMONEY, a market town of Ireland, in the county of Antrim, and the seat of the linen manufacture, is situated near the north bank of a stream which falls into the Bann about 3 miles W., and is a station on the Belfast and Northern Counties Railway. It is largely concerned in the linen trade, but by no means so extensively as Bally-

mena. It has a church, Roman Catholic chapel, meeting-houses, town-hall, and union workhouse. The population in 1881 was 3049.

BALLYSHAN'NON, the most important town of the county of Donegal, Ireland, is situated at the head of a small inlet running into Donegal Bay, into which the Erne discharges its waters. This fine river flows through the town, and forms a beautiful cascade, where it falls into the sea over a ledge of rocks 10 feet above the level of ordinary tides, which is the scene of the salmon leap. The town comprises three very steep streets, and the suburb of Punt. It has a church, Roman Catholic chapel, and Presbyterian and Methodist meeting-houses. The harbour is exposed to westerly winds, which, added to the difficulties of the bar, renders the export trade very trifling, and limits the business of the town almost entirely to the supply of the poor though extensive surrounding district; but there is a very large and profitable salmon fishery. The population in 1881 was 2840.

BALM (*Melissa officinalis*) is a plant belonging to the natural order LAMIACEÆ. It has a rough aromatic taste

feet high, with slender branches, and trifoliate leaves. Another name for this product is "balm of Mecca." The "balm of Gilead fir" is the balsam fir.

BALMOR'AL CASTLE. This royal residence is situated on the right bank of the river Dee, in a romantic part of the Highlands, about 50 miles W. by N. of Aberdeen. The mansion consists of a centre, square and lofty, with two wings. The apartments are spacious, and the views beautiful and romantic. The queen selected this as a royal residence in September, 1848, and has since that period spent a few weeks of each autumn in this retreat. Until 1851 the domain of Balmoral was only rented by the queen. In that year the estate, 7 miles in length and 4 in breadth, was purchased by the royal family for £32,000. The present castle was erected 1853-55 from designs of the Prince Consort, at a cost of £100,000.

BALSAM OF SULPHUR, an ointment used in medicine as an application to foul ulcers. It is made in England by dissolving one part of flowers of sulphur in eight parts of olive-oil. In Germany it is made by adding one part of sulphur to three of turpentine.

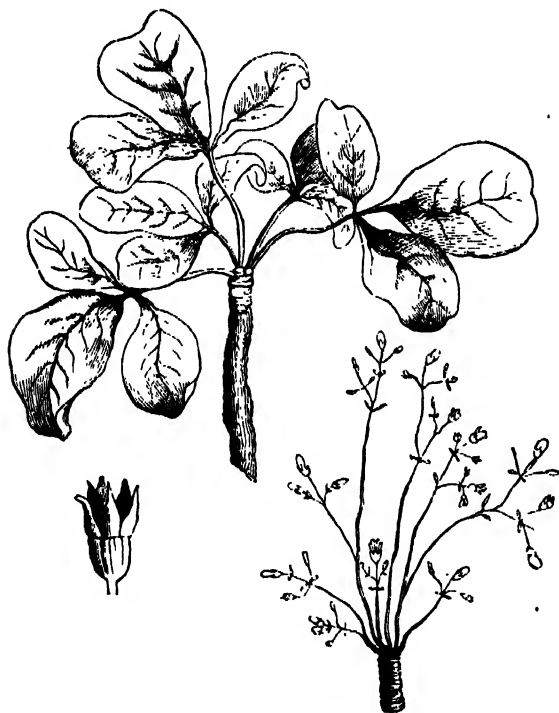
BALSAMODENDRON is a genus of oriental trees belonging to the order BURSERACEÆ. It is the *balsamon dendron*, or balsam tree, of Theophrastus. There are fifteen species natives of tropical and sub-tropical Africa, Arabia, and the West Indies. Myrrh, balm of Gilead, and bdellium are products of some of the species. These trees are natives of N. E. Africa, N. W. India, and the countries between. The flowers are small and green. There are four sepals, four petals, and eight stamens. The fruit is small and drupe-like.

BALSAMS are obtained from certain plants, chiefly of the Leguminosæ or pea tribe, and the Styracææ or storax tribe. Numerous substances of a resinous nature were formerly designated *balsams*, and turpentine and balsams are still popularly confounded with each other. The term balsam, however, should be limited to such articles as contain *benzoic* or *cinnamic acid* along with a volatile oil and resin. The others, which contain only volatile oil and resin, should be called turpentine or oleo-resins. "Balsam of Peru" is the produce of *Myroxylon Periferum*, a tree 50 feet high, which grows on the coast of San Salvador, Central America. The balsam exudes from the trunk of the tree after the removal of the bark, which has previously been scorched by fire. It has stimulant and expectorative properties, and has been successfully used for chronic bronchitis, rheumatism, and asthma. "Balsam of Tolu" is obtained from incisions made in the bark of *Myroxylon Toluifera*. It is a native of Venezuela and New Granada, and is a much larger tree than the preceding, growing to a height of 80 feet. Besides being put to the same uses as the balsam of Peru, it is also employed by perfumers, and is an ingredient of cough lozenges. Another true balsam is *STORAX*. "Canada balsam" is not a balsam, but a turpentine—the produce of the balsam fir (*ABIES*). The "balsam of COPAIBA" is a turpentine.

BAL TIC PROVINCES. This term comprehends, Courland, Livonia, Esthonia, Petersburg, and Finland, which, Courland excepted, once belonged to Sweden. In enumerating the Baltic Provinces, the two last-named are sometimes not included. They now belong to Russia, and have an area of 200,000 square miles, with a population of only 5,000,000.

BAL TIC SEA is a close sea, which occupies, as it were the centre of northern Europe, separating Sweden and the Danish islands from Germany and Russia. It extends from 54° to 66° N. lat., and from 10° to 80° E. lon.

Its great length and comparatively small breadth give it the form of an extensive gulf, and such it would be con-



Balsamodendron Katalpa.

and a pleasant lemon like smell. It is frequently used in infusion, under the name of "balm tea," as a common drink in fevers. It was one of the medicines recommended by Paracelsus, but at the present day it is only used as a popular remedy. The "balm" of the Bible, or "balm of Gilead," is a resinous substance, which was considered by the ancients a remedy for all diseases. It was an ingredient of incense and the holy oil, and was used in embalming and perfumery. Like the kindred substance myrrh, it is composed of a gum, a resin, and a volatile oil. The Hebrew word *tsori* is derived from the verb *tsarah*, to make an incision, as it is in this way that it is obtained. The "balsam tree," which produces it, is the *Balsamodendron Opobalsamum*, a native of Arabia, but which once grew also in Gilead and round Jericho. It is a small tree, 10 to 12

sidered if it were not separated from the Atlantic Ocean by the low and comparatively narrow tract of land which forms the north-western part of Prussia, called Schleswig. It is connected with the ocean by means of a large gulf, called Kattegat, which separates Denmark from Norway and Sweden, and by three straits, the Sound, the Great Belt, and the Little Belt, which may be considered as three gates by which the Baltic Sea is entered. Between Denmark and Prussia the Baltic extends from west to east, but between Cape Torshamn in Sweden and Cape Brusterort in Prussia it bends to the north, and the remainder of the main body lies nearly due north and south. The longest straight line drawn through the Baltic would be about 900 miles; the width nowhere exceeds 200 miles. The area is computed at 160,000 square miles. The Gulf of Bothnia joins the Baltic on the north, and the Gulf of Finland prolongs it on the east. The southern coast, westward of the Gulf of Livonia, is low and sandy, and lined by numerous sandbanks. This part of the coast is characterized by fresh-water lakes called Haffs, which are separated from the sea by very narrow and sandy but somewhat elevated tracts of land called *Nehrungs*. Eastward of the Gulf of Livonia the shores are generally more rocky.

The basin of the Baltic Sea is of considerable extent. On the south it receives, by the Oder and Vistula, the drainage of countries which lie 300 miles and upwards from its shores. On the east it does not extend quite so far; yet the Niemen and the Dniäna, near their sources, drain countries which are from 250 to 300 miles from the sea. To the north of the Gulf of Finland the basin of the Baltic becomes more contracted, though round the Gulf of Bothnia, and southwards to the parallel of Stockholm, it generally extends 150 miles from the coast. It is only at its western extremity, where it approaches the North Sea, that the waters falling into it have a short course, frequently only a few miles. The drainage of more than one-fifth of the surface of Europe flows to the Baltic.

Perhaps in no other inhabited part of the globe does such a quantity of snow fall as in the countries round the Baltic. This phenomenon may be accounted for by the atmosphere of the Baltic being alternately filled with warm moisture, and subjected to a dry piercing cold, and by the frequent and rapid transition from one to the other. The warm moisture is brought from the south-west and west, while the cold dry air comes from the north-east and east. Though not endowed with great fertility, the soil being, with very few exceptions, sandy and light, the Baltic Provinces abound in timber of the best quality; they support in their green pastures large herds of cattle, and produce abundant crops of grain, which have made these districts the richest granary of the globe. No other portion of the earth approaching so near the Polar Circle can be compared with them in natural wealth. The immense quantity of melted snow-water that falls into the Baltic renders its waters much less salt than those of the Black Sea. Its average depth is small compared with its area, being on an average only from 40 to 60 fathoms. It rarely exceeds 100 fathoms, but between the Island of Bornholm and the coast of Sweden it is 115 fathoms. The depth is least near the mouths of the large rivers, which bring down a great quantity of earthy matter, especially in the spring. To these two circumstances—the small degree of saltiness and the little depth of its waters—is it to be attributed that the shores of the Baltic are nearly every year covered with ice, generally shutting up the harbours, straits, and bays, and interrupting navigation for from three to five months. In severe winters large portions of the Baltic have been frozen sufficiently hard to allow an army to pass over. The curious phenomenon of the formation of bottom ice is often observed in the Baltic. In calm weather water of from 4 to 8 feet in depth is often covered, in a very short time, with small plates of ice, mostly circular in form, varying in diameter from 1 to 5 inches, and having a uniform

thickness which never exceeds 2 lines. These plates can be seen coming up from below, rising edgeways towards the surface, often with such force as to lift themselves 3 or 4 inches out of the water.

The current of the Baltic may be compared to that of a wide river or a large estuary. It commences at the remotest extremities, and its course is towards the outlets of the sea. The greatest volume of fresh water is discharged by numerous rivers into the northern part of the Gulf of Bothnia; and the current thus produced determines that of the Baltic generally. The tides are felt very little in the Baltic—the rise at Copenhagen being only 1 foot.

The Baltic does not abound in fish either as to species or numbers. The chief fishery of the Gulf of Bothnia is that of the *straemling*, a kind of small herring. Among the Danish islands the cod and other varieties are caught; and are found in several places salmon, sturgeon, turbot, and flounder.

The Swedes who inhabit the coasts long since observed that some places formerly covered by the sea had become dry land in the course of time, and it is now a well-authenticated fact that the land is gradually rising. Sir C. Lyell, however, estimated that the rise has been over-estimated, and that there has not been, on an average, an elevation of more than 40 inches in a century during the historic period. In the southern part of the country, moreover, it is believed that there has been an actual subsidence. The Baltic is becoming shallower, and while its water is far less salt than that of the North Sea, the fauna presents a curious mixture of marine and fresh-water species. At a depth of 12 fathoms fresh-water *Limnae* are found side by side with *Nereids*, *Polynoes*, and other marine creatures; and some, supposed to be peculiar to the Baltic, preserve a strong resemblance in form to those found in the Arctic seas. In the waters swim *Cyprini* and other fresh-water fishes.

BALTIMORE, a large city in Maryland, United States, is situated on the north side of the river Patapsco, 14 miles from its entrance into Chesapeake Bay. It is 37 miles from Washington and 98 from Philadelphia by railway. The situation of Baltimore is undulating and picturesque; it has a fine climate and sky, and is very healthy. The population in 1880 was 332,313, of whom one-third were Germans; in 1860 it was only 212,000. The town was laid out in 1729, and in 1765 contained only fifty houses. It received a charter as a city in 1797, and since that period its extension has been rapid, owing to its favourable position for foreign trade. The city is built round a basin which forms one of the securest harbours in the United States, and is capable of containing 2000 vessels. The harbour was at all times deep enough to receive ships of large burthen, but only comparatively small vessels could go right up to the town. This has, however, been obviated by deepening the channel to 24 feet at mean low water, which has very much improved the port, and largely increased its commerce. The harbour is accessible through a great part of the year, but is sometimes obstructed by ice.

The exports consist principally of tobacco, wheat, wheat-flour, maize, hemp, and flax; and the imports of colonial produce and the principal European products and manufactures. The export trade has of late years been greatly increased by railways, which connect the town with the western states, and bring to it for sale, exchange, or shipment, a large portion of the various products of that vast region. The exports of grain are now second only to those of New York.

The city is well supplied with good water by numerous fountains; an aqueduct, half a mile long, also conveys water from the Jones' Falls River to a reservoir capable of containing about 600,000,000 gallons, whence it is distributed in pipes through the city. The water-power of the Jones' Falls and of the Patapsco, which has a fall of 800

feet in a course of 30 miles, is made available in the numerous flour-mills, cotton factories, and other manufactures of cloth, paper, iron, copper, glass, steam-engines, tobacco, chemicals, powder, &c., in the environs of the city. In the city itself there are cotton factories, tanneries, distilleries, breweries, sugar refineries, potteries, saw mills, glass-works, rope-works, tobacco manufactures, &c. Shipbuilding is very extensively carried on, and an immense business is done in "canned goods," i.e. in the packing of fruits and vegetables, and also of oysters.

Baltimore is laid out with regularity; the streets are spacious, and the houses are well built, generally with brick. From east to west it is about 5 miles long, and from north to south about 4 miles broad. It is divided into two nearly equal parts by the rapid stream "Jones' Falls." Many of the early settlers in Maryland were Roman Catholics, and the Roman Catholic cathedral is still the chief ecclesiastical edifice in the city. It is a massive building of granite, 190 feet long, 177 broad, and 127 in height to the top of the cross. It has one of the largest organs in the United States, and also contains two beautiful paintings, presented respectively by Louis XVI. and Charles X. of France. The Roman Catholics in Baltimore are now, however, far outnumbered by other denominations, and have only about an eighth of the 200 churches. Among the other public buildings may be mentioned the City Hall, the Court House, the state penitentiary, the county prison, and the Battle Monument, erected in 1815, to commemorate the successful defence of the city against the British in September, 1814. The names of those who fell in the battle are inscribed in letters of gold. There are various benevolent institutions, among which are Hopkins' Hospital, the almshouse, 375 feet long, with spacious grounds, several dispensaries, and orphan asylums. The City Hall, an imposing edifice of white marble, which occupied eight years in building, and cost nearly 3,000,000 dollars, was opened in 1875. The city contains a monument to General Washington, sculptured in Italy.

The University of Maryland, which is situated in Baltimore, was incorporated in 1812, and the Baltimore College has since been merged into it; it has an academical and scientific, a medical and law department. St. Mary's Catholic College is a flourishing institution, and has a library of 14,000 volumes. Among the other literary and scientific institutions, the Maryland Institute for the diffusion of scientific and mechanical knowledge, the Maryland Academy of Science and Literature, and Ashbury College, are deserving of particular notice. Besides these there are a large number of excellent schools, and several public libraries. The Peabody Institute, for public lectures and instruction, endowed by Mr. George Peabody, was opened in 1867. Baltimore has a large number of public squares and parks; the largest of the latter is Druid Hill Park, which has an area of over 700 acres, and retains some magnificent trees and many natural beauties.

BALTIMORE, LORD, founder of the colony of Maryland, in North America. The family name of the Lords Baltimore was Calvert; they were originally of Flemish extraction, but for a long time were settled in Yorkshire, where they were large landholders. George Calvert, the first Lord Baltimore, held several lucrative situations, and obtained extensive grants of land in Ireland and Newfoundland under James I.; but having, in the year 1624, become a Roman Catholic, he was compelled to give up his office of secretary of state, and to abstain altogether from interfering in public affairs, the intolerant spirit of that age prohibiting the open exercise of the Catholic worship. The French having taken possession of a settlement in Newfoundland, upon which Lord Baltimore had expended a very large sum of money, Charles I. made him a grant of all that tract of country which constitutes the present state of Maryland, but he died before the grant

was legalized; and the patent or charter was accordingly made out in the name of his son Cecil, the second Lord Baltimore. This charter is dated the 20th of June, 1632. Under it about 200 persons of respectable family, and mostly of the Roman Catholic faith, entered the Chesapeake Bay in February, 1634. Having purchased a village from the native Indians, they proceeded to organize the new colony, which they called Maryland, in honour of Henrietta Maria, the wife of Charles I. The experiment was most successful [see MARYLAND]; a representative form of government was established; all persons professing a belief in the divinity of Christ were declared eligible to the civil advantages of the state, without distinction; and as long-continued persecution had taught the Catholics the wholesome lesson of religious tolerance, the constitution of Maryland stood alone in not sanctioning laws directed against liberty of conscience. This most honourable exception, which, however, did not extend to the Jews, soon made Maryland an asylum to those persecuted for conscience' sake in the mother-country or in the adjacent settlements. Carlyle gives in his celebrated "Cromwell's Letters and Speeches" a highly characteristic letter (Letter xcvi.) of my Lord Protector to the governor of Virginia. "Whereas," says he, "by opposing the Lord Baltimore's officers you have much disturbed that colony and people, to the endangering of tumults and bloodshed there, if not timely prevented: we therefore do require you . . . to forbear disturbing the Lord Baltimore or his officers or people in Maryland," &c. The Virginians had been disputing boundaries with their new neighbours, not without some rough work, which had come to the ears of their "loving friend Oliver." Lord Baltimore died in 1676, at an advanced age.

BALTIMORE ORIOLE (*Icterus baltimore*) is a beautiful bird belonging to the same family as the STARLING. It is a summer visitor to the United States of America, and receives its name from its black and orange plumage, those colours being the livery of Lord Baltimore, the proprietor of Maryland. It is about 7 inches in length, and has the head, throat, upper part of the back, and wings black; the remainder of the plumage is bright orange, becoming vermilion-red on the breast; the wing-feathers are edged with white, and the tail-feathers black and orange. The female exhibits nearly the same arrangement of colours as the male, just described; but the black is brownish, and the orange tints are paler and duller.

The nest of the Baltimore oriole is a beautiful pendulous structure, composed of fibrous materials neatly and strongly interwoven, and suspended from the flexible extremities of the branches of trees. Selecting two of these high up in a tree, the bird fastens strong strings of hemp or flax around them, and then proceeds to weave a sort of pouch of similar materials, so well worked up as to form a coarse cloth-like fabric. This pouch, which is 6 or 7 inches in depth, is lined with soft substances, firmly interwoven with the outer coat, and the interior is finished with a layer of horse-hair. The opening, which is at the top of the nest, is generally sufficiently protected by the overhanging leaves; but sometimes it is furnished with a horizontal cover. Almost any fibrous material seems to be welcome to this ingenious little weaver when engaged in the construction of its nest; skeins of silk and hanks of thread are often carried off and worked into the edifice, and even the bits of soft band with which gardeners fasten their grafts and buds are sometimes purloined for similar use.

The eggs are five in number, of a pinkish-white colour, marked at the larger end with purple dots, and on the rest of the surface with fine, irregularly intersecting, hair-like lines. The bird's food consists principally of insects.

BALUCHISTAN or **BELOOCHISTAN**, is the country of his Highness the Khan of Kelat. This country lies south of Afghanistan, extending on the south to the

Arabian Sea, on the east to the frontier of Scinde, and on the west to Persia. It extends from lat. $24^{\circ} 58'$ to $30^{\circ} 20' N.$, and from lon. 61° to $69^{\circ} 45' E.$, its greatest length on the N. from east to west being about 550 miles, and greatest breadth north to south about 380 miles. Its area is about 160,000 square miles. Its coast-line is remarkably regular but craggy, and not much elevated; towards the interior, however, there is rapid elevation. On the coast there are several well-sheltered roadsteads, particularly Sonmiani Bay and Chahbar Bay, but no good harbours.

The country comprises seven divisions or provinces, viz. Cutch-Gandava, on the north-east; Sarawan, on the north; Jhalawar, on the east; Lus, on the south-east; Makran, the *Gedrosia* of the ancients, occupying an extensive length of country, on the south; Kohistan or the mountain country, on the west; and Kelat, in which is situated the capital of the same name. The eastern side of the country is crossed from north to south by the Hula and the Khirturi ranges of hills, which are a continuation of the Suliman range, but there are no very lofty eminences. The interior is rugged and barren, presenting a maze of mountains, except on the north-west, where desert prevails. The general direction of the highlands is east and west, parallel with the coast from the Indus delta to the Persian frontier. A little way inland from the Arabian Sea one vast range stretches along the entire length of the coast. Parallel to this range, and at a distance of about 70 miles north from it, another well-defined chain intersects Makran and joins with the Sarawani Mountains near Bela. A third parallel range, called the Washuti or Mue Mountains, about 110 miles further north from the last-mentioned chain, forms the northern boundary of Baluchistan, separating it from the great southern desert of Afghanistan. The other principal chains are the Bushkurd Mountains, about 240 miles in length, and the Sarawani Mountains stretching in a north-east direction. The intervening valleys ascend successively to a height of 3000 feet, and there is no serious difficulty for wheeled traffic along them for a length of 250 miles to the Persian frontier, where the way is closed in by the intricate mountain system of West Makran. Most of the space enclosed within the highlands is high sandy plateau, sinking everywhere towards the great central depression of the Hamun Swamp on the north-west. The southern portion of the country has been crossed from the Indus to Persia by Pottinger, Ferrier, Lovett, and other travellers; but by far the larger part to the north of the second mountain range is sterile desert, into which no European has ever penetrated. The most fertile and pleasant district is that of Cutch-Gandava, which reaches down from the high north-eastern plateau, to include the well-watered slopes of the mountains and part of the plain of the Indus at their base. At Gandava, on this fine plain, is the summer residence of the Khan of Kelat.

There are during the wet season about twenty-two streams sometimes called rivers, but strictly speaking Baluchistan is almost as riverless a country as Arabia itself. With trifling exceptions all the streams dry up or are lost in the earth during dry weather, and at other times they are destructive mountain torrents. Several rush down through well-known mountain passes, such as Bolan and Mula, but few if any of the others have regular and well-defined channels.

Through the Hala or Brahni range which intervenes between Baluchistan and the Indus valley there are numerous passes, of which the Bolan and Mula are the chief. The Bolan is described under AFGHANISTAN.

The climate of Baluchistan is extreme. The cold during winter is exceedingly intense, snow lying on the ground for two months even in the fertile valleys, while in summer the heat is overpowering, especially on the lower grounds. The coast region of Makran is in summer the hottest district in Asia. In February and March a good deal

of rain falls, after which the dry season commences, and lasts till September.

The country is said to be rich in minerals, copper and iron especially being met with in large quantities; and gold, silver, lead, antimony, saltpetre, and sulphur are also to be found. There are mud volcanoes at Lus, near a place where iron-ore is worked. The soil is not in general fertile, but patient industry has rendered many of the plains and valleys productive in wheat, barley, the millets and pulses of various kinds, oil seeds, cotton, rice, indigo, and tobacco. The sugar-cane grows chiefly on the plains of Lus, and the date in Makran. Vegetables of every kind are abundant, and the gardens and orchards in the vicinity of the towns produce the finest fruits. The lion, tiger, leopard, and wolf are occasionally met with; the jackal, wild dog, fox, wild goat, and ass more frequently. Both species of camel occur, the Bactrian or two-humped on the uplands, the dromedary on the plains, where it is highly valued. Serviceable horses are bred in the north and west. The curious *Uromastix* lizard found here somewhat resembles a rabbit in appearance. It has the peculiar habit of bleating like a kid to attract the goats, whose teats it then sucks. The Makran coast abounds in fish, which still forms the staple food of its ichthyophagous or "fish-eating" inhabitants, as these people were described by the geographers of Alexander the Great. The manufactures of Baluchistan are unimportant, being confined to a few matchlocks and other fire-arms in Kelat.

The population is estimated at only about 500,000, although the area is equal to that of the United Kingdom. The sterility and scanty resources of a great part of the country doubtless account for the very small number of its people. The inhabitants are divided into two main branches, the Baluchis and the Brahuis, differing in language, figure, and manners. The Baluchis are tall, well-formed, and of dark complexion; the Brahuis, so called from the words *bah-rui-i* ("on the waste"), are much shorter and broader, with hair and beard frequently brown. They are most numerous in the province of Jhalawar and in Kelat, where the *khan* is of Brahui stock. They have great physical strength, and are generally more peaceful than the Baluchis. They are, moreover, the aboriginal and most numerous element—the term Baluchistan, unknown in the country itself, being thus quite inappropriate. Both races are pastoral, hospitable, brave, excellent marksmen, and capable of enduring much fatigue, and belong to the Sunni sect of Mohammedans. Neither possesses a written language, and their early histories have not been preserved. Mr. Floyer, one of the most recent travellers in Baluchistan, speaks very highly of the people as being exceedingly trustworthy, with a fine vein of natural humour, and the best fellow-travellers in the world. Polygamy is universal—few, however, having more than two wives. Wives are obtained by purchase, and paid for in sheep, &c.; and a man is expected to marry the widow of a deceased brother. On the occurrence of a death the body is watched for three nights by friends and relatives, and the time is passed in feasting.

The government is despotic, the *khan* having unlimited power. His rule in this sense, however, is confined for the most part to the province immediately around his capital, a large portion of the country being held by tribal chiefs, over whom he has little or no control, though they furnish contingents of men in case of war and pay tribute. In 1877 the *khan* concluded a treaty with Great Britain, in virtue of which he became a feudatory of the Empress of India. The right had already been secured of occupying at pleasure the mountain passes, but the new treaty placed the whole country at the disposal of the British government for all military and strategical purposes. The advantages to the *khan* were that his authority was somewhat consolidated, for the tribal chiefs ceased seriously to question the authority of a ruler with whom the *Kaisar-i-Hind*

was in treaty alliance. There has been accordingly greater peace within the country, and Persian encroachments on the west have been discontinued. The chief towns in Baluchistan are Kelat, the capital, about 6000 feet above the sea, Bela or Los near the coast, Dadar, Gandava, Mustang, Nushki, Sarawan, Kej, Pasni, Dera, Sonniani, and Quetta. The languages spoken are Baluchi and Persian.

("The Country of Baluchistan: its Topography, Ethnology, and History," A. W. Hughes, London, 1877; "Unexplored Baluchistan," Ernest A. Floyer, London, 1882; "Wanderings in Baluchistan," Sir C. M. Macgregor, London, 1882.)

BAL'USTRADÉ, the termination of a modern "classical" edifice, with a row of *balusters*, short columns or rails deriving their name from some fancied resemblance to the flower of the wild pomegranate (*balaustion*). There does not appear to be any example of a balustrade in the remains of antiquity now existing, although there are examples of railing or fencing. Balustrades are most commonly placed over the cornices of large edifices, after the manner of a parapet, as at the lunqueting-house at Whitehall and at St. Paul's Cathedral. Balustrades are not only employed in large edifices, above the orders of architecture, but also serve to inclose stairs, terraces, altars, fountains, and the balconies of houses. The balusters forming a balustrade are placed on a plinth, at equal distances from one another, with a small opening between them; they support a cornice, and are divided at intervals by a pedestal. *Banister* is a corrupt term for baluster, and is used to express the wooden railings inclosing stairs.

BALZAC, HONORÉ DE, a French novelist, born at Tours, 20th May, 1799; died at Paris, 20th August, 1850. He left school with the character of being "idle and disobedient," and was placed with a notary, to whom he acted as clerk. He commenced his literary career by writing for the journals; and finding his position with the notary altogether unsuited to his disposition, he abandoned it, and endeavored to support himself by his pen. His industry was remarkable, but though during the next ten years he wrote about thirty volumes, which were published under assumed names, he failed to gain public attention, and suffered much from poverty, being often compelled to make a few half pence suffice for his daily expenses. In 1826 he joined a printer named Barbier in partnership, and while with him he published several works; but the speculation was unsuccessful, and he returned to the work of simple authorship, laden with debt. He had, however, a constant belief in his own genius, and persevered with indomitable courage, till at last, in 1829, his work entitled "Les Derniers Chouans," published in his own name, gained for him public recognition, and opened the way for his future career.

He now formed the bold conception of depicting the natural history of society as it existed in his own day in France. He wished to treat the moral world of men and women in the same manner that the naturalist treats the habits of the lower animals—to describe minutely and accurately, but merely to describe. He, therefore, prepared to paint in detail private life, life in the provinces, military life, political life, &c., viewed philosophically and analytically, and thus, "by infinite patience and courage, to compose for France of the nineteenth century that history of morals which the old civilizations of Rome, Athens, Memphis, and India have left untold." It is, perhaps, needless to say that the "Comédie Humaine" was never completed. During twenty years of indefatigable industry and prolific authorship he pursued this course of study, and gave to the world an immense number of compositions, some of which take a place in the first rank in their special departments of literature. Among his best works are—"Physiologie du Mariage" (two vols., Paris, 1831); "Scènes de la Vie Privée" (five vols., 1831); "Scènes de la

Vie de Province" (1832); "Scènes de la Vie Parisienne" (1832); "Le Médecin de Campagne"; "Le Père Goriot"; "La Peau de Chagrin"; "La Femme de Trente Ans"; "L'Histoire Intellectuelle de Louis Lambert"; and "Eugénie Grandet." The last novel is one of the finest, but many are almost equally great. The "Comedy of Human Life" ("La Comédie Humaine") was to have been the title of the complete works, and those he had written were published in a complete form in forty-five volumes (Paris, 1856-59) under that title after his death. His novels were pre-eminently popular in France during the latter period of his life, and many of them are famous throughout Europe. A saying of Goethe is recorded, that "each of his stories must have been dug out of a woman's heart." It must be said, however, that along with his rich imagination, and marvellous insight into character, he displays a looseness of taste which an artist of a higher order would have striven to correct. The "Comedy of Human Life" is too comprehensive a title for his works, in which the mirror is not held up to nature so much as to the unnatural elements of the modern French society in which he lived. He depicts a wide variety of human character, but the whole forms, not a "Comedy," but rather a "Pathological Museum of Human Life"—a collection of specimens every one of which exhibits disease. Balzac has created, indeed, in these wonderful novels, a world of his own. Characters appear and disappear almost as in real life; and we learn their history by episodes, now under one aspect in one book, now under another in another book, till we know them by heart. Yet not one of them is truly natural, any more than is the art of a good actor upon the stage. Balzac's people are all actors, and we know it; but so consummately consistent is the acting in that gorgeous "Comedy," that the auditors sit spell-bound—only too willing to believe in the cherished delusion.

The cause of his death was hypertrophy of the heart. He was buried in Père-la-Chaise, and almost the whole literary world of Paris attended his funeral, the *éloge* over his grave being pronounced by Victor Hugo.

BALZAC, JEAN LOUIS GUEZ DE, Seigneur of Balzac, was born at Angoulême in 1594. A residence of some years in Italy led him to compare the high polish which the language of that country had attained, and the rich literature which it had produced, with the rude and barren condition of the language and literature of his native land. On his return to France he fixed himself at Paris and began writing, became a friend of Richelieu, and joined the French Academy. With the assistance of a cultivated taste, an extensive reading of the Latin classics, and a good ear, he contrived to introduce a harmony, a precision, and a correctness of style which were before unknown, into French prose. He died in 1655. His works were published at Paris in 1665 in two vols. A good selection has been edited by Malitourne (Paris, 1822).

BAMBAR'RA is an extensive country in the interior of North Africa. Towards the north it is bounded by the great desert of the Sahara, about 16° N. lat., and to the south it extends to about 9° N. lat. The eastern and greater part of the country is a plain, slightly undulating, and intersected by rivers of considerable size, which in the rainy season overflow their banks and inundate considerable tracts of land.

The climate is various. It is sultry and oppressive in the plains, but where the country rises into hills the air is at all times comparatively cool. About the middle of June the hot and sultry atmosphere is agitated by violent gusts of wind, accompanied by thunder and rain. These usher in the rainy season, which continues till November. During this time the diurnal rains are very heavy, and the prevailing winds are from the south-west. The termination of the rainy season is likewise attended with violent tornadoes, after which the wind shifts to the north-east, and continues

to blow from that quarter for the rest of the year. The north-east wind, called the *harmattan*, in passing over the great desert, becomes hot and dry, and parches up everything exposed to its current. The country is intersected by the *Jobila* or *Upper Niger*, on whose banks are the chief towns—*Sego*, *Bamaku*, *Yamina*, and *Sansanding*, the first of which is the capital.

The chief mineral wealth of *Bambarra* is iron; it abounds in many districts, and the inhabitants make utensils of it, which are exported to the neighbouring nations. Gold is also found. Salt is imported in large quantities from the *Sahara* and the coasts of *Guinea*.

A considerable number of vegetables are cultivated, especially rice, maize, millet, yams, cotton, water-melons, French beans, and onions. In the rainy season cabbages, carrots, and turnips are raised. Tobacco is planted in some districts, and in others the indigo plant grows spontaneously. It is remarkable that very few fruit-trees exist, except the pistachio. Among the trees the most remarkable is the butter-tree, called by *Park* shea-tree, and by *Cuillie* *cé*. From the kernel of this tree an ash-gray butter is extracted, which is a considerable object of agricultural industry and trade. In the southern district the enormous baobab is very common, and its fruit much esteemed. Among other trees are *Bambucea*, of great size, and tamarind trees. Ropes are made of *Ribes* *cannibinus*, and the *Rhamnus* *lotus* bears a fruit of a pleasant taste, rather acid, and in colour resembling gingerbread. Many districts are covered with extensive forests.

The pastures, both in the wooded tracts and in the open plains, being extensive and excellent, the domestic animals are numerous, as horned cattle, sheep, goats, and horses of a fine breed. Poultry and guinea-fowl abound. Dogs are reared and fattened for food. In the rivers there are alligators and turtles, besides fish in great abundance. Dried fish is a considerable article of commerce. The marshes, which in many parts are of very great extent, are frequented by pelicans, egrets, trumpet-birds, puffins, Barbary ducks, teal, and various other species. A large quantity of honey is collected from bee-hives placed in trees.

The aborigines of *Bambarra* are a tribe of negroes, from whom the country has received its name. They compose the peasantry, but the soil is ill cultivated, and their villages disgustingly dirty. Their food is very bad; they eat all sorts of animals, dogs, cats, rats, mice, serpents, and lizards. Nearly all that they cultivate for the market is a little cotton, which they exchange for salt. The rest of the *Bambarrese* are composed of *Mandingoes* and *Foulahs*, who form the population of the towns.

BAMBERG, a large town in *Bavaria*, in the circle of *Upper Franconia*. It stands on the *Regnitz*, a little above where this river falls into the *Main*. The town is about 37 miles north of *Nuremberg*, and is situated in a very fertile district. It is built on five hills, and presents a handsome and striking appearance. *Bamberg* was formerly the residence of the prince-bishops of *Bamberg*; it is now the seat of an archbishop and of the higher courts of justice of the circle. The *Regnitz* divides into four branches in the town; these are crossed by several bridges, one of which (*Ludwigsbrücke*) is a suspension bridge. The main streets are of handsome breadth and length, and well paved. The suburb called the "*Steinweg*," formerly the *Tenerstadt*, presents the longest line of dwellings, and is the most populous quarter of the town; the deep ditches bordering its ramparts, which have been razed, are laid out in walks and gardens. Amongst the buildings most deserving of notice are—the cathedral, a noble structure in the *Byzantine* style of architecture, and one of the finest *Romanesque* edifices in *Germany*. It was built by the Emperor *Henry II.* in 1002, and restored in 1827. It contains many fine monuments and pictures. The other chief buildings are the former episcopal palace, on a hill called

Petersberg, which is now a royal residence; the great hospital, with its schools of surgery and medicine; the former college of the *Jesuits*, to which is attached the beautiful Church of *St. Martin*, a cabinet of natural history, and an extensive library; and the *Maxplatz*, a large square ornamented with a colossal statue of *King Maximilian*. Among the literary and scientific establishments of *Bamberg*, besides those attached to the great hospital, are the archiepiscopal seminary, lyceum, historical society, gymnasium, public library, and picture gallery. The numerous incorporations in the town include that of the gardeners, which consists of masters, apprentices, and workmen. The highest prize which it gives—and it is given but once in three years—is for the cultivation of official plants, particularly the liquorice root, of which above 50,000 lbs. are annually exported. Very considerable quantities of vegetable seeds are raised and exported by the *Bamberg* growers, and the neighbourhood is like a vast garden. There are sixty breweries, and *Bamberg* beer is in much demand. The other manufactures consist of tobacco, porcelain, musical instruments, marble wares, starch, sealing-wax, gold and silver plate, gloves, &c. Iron works, sugar-refining, and cotton-spinning are also carried on. The population of the town in 1881 was 29,587.

BAMBINO, the figure of the infant Christ wrapped in swaddling clothes and watched over by angels, which is frequently the subject of the altar-piece in *Roman Catholic* churches. The most celebrated of these is the "*Santissimo Bambino*" in the Church of *Ara Coli*, beside the *Capitol* at *Rome*. This is carved in wood, painted red, and its dress and crown are decorated with the most superb jewels. It is supposed to be endowed with miraculous powers of healing, and its festival, which is held at *Epiphany*, is always largely attended by the peasantry, who make a pilgrimage for that purpose.

BAMBOO (*Bambusa*) is a genus of *GRASSES* well known for its great economical importance. The flowers have generally six, sometimes only three stamens. The spikelets of flowers are arranged in panicles. The stems are universally pushed forth by a strong, jointed, subterranean, creeping root-stock, which is the true trunk of the bamboo, the shoots being the branches. The latter are hard externally, and coated with flinty matter; in the inside they are hollow, except at the nodes, where strong partitions stretch across the inside, and cut off the interior into a number of closed-up cylinders.

In the cavity of these cylinders water is sometimes secreted, or, less commonly, an opaque white substance, becoming opaline when wetted, consisting of a flinty secretion, of which the plant divests itself, called *TARASHEER*.

The purposes to which different species of bamboo are applied are so numerous, that it would be difficult to point out an object in which strength and elasticity are requisite, and for which lightness is no objection, to which the stems are not adapted in the countries where they grow. The young shoots of some species are eat when tender, and eaten like asparagus. The full-grown stems, while green, form elegant cases, exhaling a perpetual moisture, and capable of transporting fresh flowers for hundreds of miles; when ripe and hard they are converted into bows, arrows, and quivers, lance-shafts, the masts of vessels, bed posts, walking-sticks, the poles of palanquins, and a variety of similar purposes.

Mr. A. R. Wallace, in "*Tropical Nature*," states that "in the city of *Palembang*, in *Sumatra*, there is a complete street of floating houses supported on rafts formed of huge bundles of bamboos. Bridges across streams, or to carry footpaths along the face of precipices, are constructed by the *Dyaks* of *Borneo* wholly of bamboos; and some of these are very ingeniously hung from overhanging trees by diagonal rods of bamboo, so as to form true suspension bridges. The flooring of *Malay* houses is almost always of bamboo,

but is constructed in a variety of ways. Generally large bamboos are used, split lengthways twice, and the pieces tied down with rattan. This forms a grated floor, slightly elastic, and very pleasant to the bare-footed natives. A superior floor is sometimes formed of slabs, which are made from very stout bamboos cut into lengths of about 3 or 4 feet and split down one side. The joints are then deeply and closely notched all round with a sharp chopping-knife, so that the piece can be unrolled, as it were, and pressed flat, when it forms a hard board with a natural surface, which with a little wear becomes beautifully smooth and polished. Blinds, screens, and mats are formed of bamboos in a variety of ways, sometimes of thin kinds crushed flat and plaited, but more frequently of narrow strips connected together with cords of bamboo bark or rattan. Strips of bamboo supported on cross-pieces form an excellent bed, which from its elasticity supplies the purpose of a mattress as well, and only requires a mat laid over it to insure a comfortable night's repose. Every kind of basket, too, is made of bamboo, from the coarsest heavy kinds to the fine and ornamental. In such countries as Lumbok and Macassar, where the land is much cultivated and timber scarce, entire houses are built of bamboo—posts, walls, floors, and roofs all being constructed of this one material; and perhaps in no other way can so elegant and well-finished a house be built so quickly and so cheaply. Almost every kind of furniture is also made of the same material; excellent bamboo chairs, sofas, and bedsteads being made in the Moluccas, which for appearance, combined with cheapness, are probably unsurpassed in the world. A chair costs 6*l.*, and a sofa 2*s.* Among simpler uses, bamboos are admirably adapted for water vessels. Some of the lighter sorts are cut into lengths of about 5 feet, a small hole being knocked through the septa of the joints. This prevents the water from running out too quickly, and facilitates its being poured out in a regulated stream to the last drop. Three or four of these water vessels are tied together and carried on the back, and they stand very conveniently in a corner of the hut. Water pipes and aqueducts are also readily made from bamboo tubes supported at intervals on two smaller pieces tied crosswise. In this way a stream of water is often conveyed from some distance to the middle of a village. Measures for rice or palm-wine, drinking vessels, and water dippers are to be found almost ready-made in a joint of bamboo; and when fitted with a cap or lid they form tobacco or tinder boxes. Perches for parrots, with food and water vessels, are easily made out of a single piece of bamboo, while with a little more labour elegant bird-cages are constructed. In Timor, a musical instrument, is formed from a single joint of a large bamboo, by carefully raising seven strips of the hard skin to form strings, which remain attached at both ends and are elevated by small pegs wedged underneath, the strings being prevented from splitting off by a strongly plaited ring of a similar material bound round each end. An opening cut on one side allows the bamboo to vibrate in musical notes when the harp-like strings are sharply pulled with the fingers. In Java strips of bamboo supported on stretched strings and struck with a small stick produce the higher notes in the 'gamelung,' or native band, which consists mainly of sets of gongs and metallic plates of various sizes. Single joints of bamboo make excellent cooking vessels while on a journey. Rice can be boiled in them to perfection, as well as fish and vegetables. They serve too for jars in which to preserve sugar, salt, fruit, molasses, and cooked provisions; and for the smoker excellent pipes and hookahs can be formed in a few minutes out of properly chosen joints of bamboo. These are only a sample of the endless purposes to which the bamboo is applied in the countries of which it is a native, its chief characteristic being that in a few minutes it can be put to uses which, if ordinary wood were used, would require hours

or even days of labour. There is also a regularity and a finish about it which is found in hardly any other woody plant, and its smooth and symmetrically ringed surface gives an appearance of fitness and beauty to its varied applications. On the whole we may perhaps consider it as the greatest boon which nature gives to the natives of the eastern tropics."

In a growing state the spiny kinds are formed into stockades, which are impenetrable to any but regular infantry, aided by artillery. The Malays make wonderfully light scaling-ladders by notching their sides, thus forming holes to receive rungs made of a slenderer bamboo. Bruised and crushed in water, the leaves and stems form Chinese paper, the finer qualities of which are improved by a mixture of raw cotton and by more careful pounding. India proof paper is made from young bamboos. Mr. Thomas Routledge strongly advises the use of bamboos as a paper-making material; the supply would be unlimited, as their growth is very rapid (40 feet in forty days at Chatsworth), and they flourish to considerable extent in tropical countries. The leaves of a small species are the material used by the Chinese for the lining of their tea-chests. Cut into lengths and the partitions knocked out, they form durable water pipes, or by a little contrivance are made into excellent cases for holding rolls of papers. Slit into strips, they afford a durable material for weaving into mats, baskets, window blinds, and even the sails of boats. Finally, the larger and thicker truncheons are exquisitely carved by the Chinese into beautiful ornaments. It is, however, as stated above, more especially for building purposes that the bamboo is important. In Sumatra also, according to Marsden, the framework of the houses of the natives is chiefly composed of this material. In the floorings whole stems, 4 or 5 inches in diameter, are laid close to each other, and across these latiss of split bamboo about an inch wide are fastened down with filaments of the rattan-cane. The sides of the houses are closed in with the bamboo opened and rendered flat by splitting or notching the circular joints on the outside, chipping away the corresponding divisions within, and laying it in the sun to dry, pressed down with weights. Whole bamboos often form the upright timbers, and the house is generally roofed in with a thatch of narrow split bamboos, 6 feet long, placed in regular layers, each reaching within 2 feet of the extremity of that beneath it, by which a treble covering is formed. Another and most ingenious roof is also formed by cutting large straight bamboos of sufficient length to reach from the ridge to the eaves, then splitting them exactly in two, knocking out the partitions, and arranging them in close order with the hollow or inner sides uppermost; after which a second layer, with the outer or convex sides up, is placed upon the other in such a manner that each of the convex falls into the two contiguous concave pieces, covering their edges—the latter serving as gutters to carry off the rain that falls upon the upper or convex layer. Over thirty different species of bamboo have been described.

BAMBOROUGH, a village situated on the coast of Northumberland, 14 miles N. from Alnwick and 5 miles from the Belford station of the North-eastern Railway, was at one time a royal burgh, and returned two members to Parliament. The castle, one of the oldest in the kingdom, stands on a perpendicular rock 150 feet above the sea, and is accessible only on the south-east side. It is now occupied as a life-boat station, an hospital for shipwrecked sailors, and is devoted to several other benevolent purposes, in pursuance of the directions of the will of a former owner, Bishop Crewe of Durham. The total income of the charity now amounts to nearly £10,000 per annum. A valuable library was founded by the trustees in 1778. The books are lent to persons residing within 20 miles of the castle. The cluster of rocks called the Fern Islands are very dangerous in hazy and stormy weather, and signals from the castle are made to warn approaching vessels.

Population of the village, 815. It is much resorted to in summer for sea-bathing. Grace Darling is buried in the churchyard, and it was on this coast that she and her father rescued the crew of the steamer *Forfarshire* in 1838.

BAMBOUK is a mountainous country in the interior of Western Africa, situated between the Senegal and its tributary the Faleme, and extending between 12° and 14° N. lat., and 8° and 11° W. lon. It occupies a part of the declivities with which the extensive system of the Kong Mountains descends towards the great desert of Sahara. The mountains afford excellent pasture to numerous herds of horned cattle, and the lower parts of the valleys produce maize and rice in abundance. The mines yield silver and iron of excellent quality, and also a great quantity of gold. The principal gold mines are situated to the south of the city of Bambouk, in the mountains of Tambacoura; but a great quantity is obtained by washing the sand which the rivers have carried down from the mountains and imbedded along their courses in the alluvial soil. Much of the gold is exchanged for cloth, ornaments, and salt. The climate is very unhealthy, especially in the rainy season. The whole mountainous tract which forms the northern declivity of the Kong Mountains is inhabited by the Mandingoes. Four centuries ago Bambouk was in the hands of the Portuguese, but they were soon driven out.

BAMIAN, a once renowned city in the territory now subject to the Afghans, situated in a valley near the Kahn Pass, which leads from Cabul to Balkh. The pass has an elevation of more than 12,000 feet. In the valley are mounds and remains of walls, and the ruins of an ancient Buddhist temple, now known as *Ghulghulak*. There are also two colossal statues, supposed to be idols, cut out in the cliffs on the north side of the valley. One is about 120 feet in height and the other about 60 feet. Of these statues in their ancient splendour we have descriptions written in the seventh century, or even earlier. Besides these extraordinary remains, the valley is strewn with the ruins of the ancient city, which seems to have been finally destroyed about A.D. 1222 by the Mongol conqueror Zenghiz Khan.

BAMPTON, a small town in Devonshire, on the confines of Somerset, 22 miles N. by E. from Exeter, and 170 from London by the Great Western Railway, being 7 miles distant from the Wivelcombe station. The town has somewhat improved of late years, and several new houses have been erected. A large cattle and sheep fair is held at the end of October. The population of the parish in 1881 was 1858.

BAMPTON is a small market town, 13 miles W. by S. from Oxford, and 79 miles from London by the Great Western Railway. It was once the residence of Aymer de Valence, earl of Pembroke, and the remains of his castle are still extant. The Church of St. Mary is a handsome cruciform building. Phillips, the poet, author of "The Spelford Shilling," was born here. The population of the township, recently much improved, in 1881 was 1395.

BAMPTON LECTURE, a perpetual endowment of a course of eight sermons, to be annually preached in the University of Oxford, between the commencement of the last month in Lent Term and the end of the third week in Act Term, at St. Mary's Church. This lecture was founded in pursuance of the will of the Rev. John Bampton, canon-residentary of the Cathedral of Salisbury, who ordered that the lecturer should be yearly chosen, upon the first Tuesday in Easter Term, by the heads of colleges only, and no others; no person to be qualified to preach the sermons unless he had taken the degree of M.A. at least, in one of the two universities of Oxford or Cambridge, and the same person never to preach the lecture twice; the sermons to be upon some one or other of the following subjects: "to confirm and establish the Christian faith, and to confute all heretics and schismatics; upon the divine

authority of the Holy Scriptures; upon the authority of the writings of the primitive fathers as to the faith and practice of the primitive church; upon the divinity of our Lord and Saviour Jesus Christ; upon the divinity of the Holy Ghost; upon the articles of the Christian faith, as comprehended in the Apostles' and Nicene Creeds." Thirty copies of these lecture-sermons are to be always printed within two months after they are preached; one copy to be given to the chancellor of the university, one to the head of every college, one copy to the mayor of the city of Oxford, and one copy to be put into the Bodleian Library; and the expense of printing them to be paid out of the revenue of the lands or estates given for establishing the lecture; the preacher not to be paid, nor to be entitled to the revenue, before they have been printed. The first course of lectures was delivered in 1780, and they have been continued every year up to the present, with the exception of the years 1831, 1835, and 1841. Among the lecturers have been Reginald Heber (1815), Whateley (1822), Milman (1827), Horne (1828), Burton (1829), Somers (1830), Hampden (1832), Mansel (1858), Rawlinson (1859), Liddon (1866), Stanley Leathes (1874), Hatch (1880), and Temple (1884).

Some of the lectures delivered have attracted considerable attention, and have proved valuable additions to theological literature, while others have given rise to sharp and prolonged controversy. The lectures delivered by Canon Liddon on the divinity of Christ may be taken as a modern instance of the former class, and the lectures of Mansel on the limits of religious thought as an instance of the latter. The annual income of Mr. Bampton's estate in 1779—in which year the first lecturer was chosen—amounted to £120, but its value has since been so much increased that each lecturer now receives £200. Similar lectures are delivered at Cambridge, founded about the same time by Rev. John Hulse. See HULSEAN LECTURE.

BAN, a word found in many of the modern languages of Europe in various senses. But as the idea of "publication" or "proclamation" runs through them all, it is evident that it is the ancient Middle English and High Dutch word *ban* still preserved in Gaelic, Dutch, and modern Welsh in the simple sense of "proclaiming." It is allied to the Latin *fama*, a rumour, and is one of the derivatives of *√BAN*, an ancient Aryan Root with the meaning "proclaim," "speak clearly." Just as our modern use of the word *proclaim* gathers year by year a more definitely prohibitive meaning, so that Dublin being *proclaimed* in November, 1882, meant that severe martial law was then enforced because of political murders in the open streets, so the word *ban*, from being a simple announcement, came to mean a cursing, or a denouncing of woe and mischief against one who has offended; and this is the use of it made by Spenser, Marlowe, and Shakespeare, Knolles, and Hooker.

When churches and monasteries were founded, writings were usually drawn up, specifying with what lands the founder and other benefactors endowed them; and those instruments often conclude with imprecatory sentences, in which torments here and hereafter are invoked on any one who shall attempt to divert the lands from the purposes for which they were bestowed. It seems that what we now read in these instruments was openly pronounced in the face of the church and the world by the donors, with certain ceremonies. This, in the English phrase, was the *banning* of the middle ages. A political banning of all who should violate Magna Charta was a periodical occurrence in the thirteenth century. Besides these general bannings, particular persons who escaped from justice, or who opposed themselves to the sentence of the church, were sometimes banned, or placed under a ban. This species of banning is meant when we read of persons or cities being placed under the *ban of the empire*, a phrase not infrequently occurring in writers on the affairs of Germany.

Persons or cities who opposed themselves to the general voice of the confederation were by some public act cut off from society, and deprived of rank, title, privileges, and property. It is manifest that out of this use of the word has sprung that popular sense in which now only the word is ever heard among us, as well as the Italian *bandire*, French *banir*, and the English *banish*. See BANISHMENT.

In France the idea of *publication* yet prevails over that of *denouncement*, and they call the public cry by which men are called to a sale of merchandise, especially when it is done by a beat of drum, a *ban*. In time of war a proclamation through the ranks of an army was the *ban*. In feudal times, when those who held of the king were summoned to attend him in his wars, they were the *ban*, and tenants of the secondary rank the *arrière-ban*. The *ban-lieu* of a city was a district around it, usually, but not always, a league on all sides, through which the proclamation of the principal judge of the place had authority. A person submitting to exile was said to *keep his ban*, and he who returned home without a recall *broke his ban*.

The French use the word as the English do, when they speak of the *ban*, or, as we speak and write it, the *banns* of marriage. This is a public proclamation of the intention of the parties named to enter into marriage. The law of the ancient French and of the English Church is in this respect the same. The proclamation must be made on three successive Sundays in the church, during the celebration of public worship, when it is presumed that the whole parish is present. See MARRIAGE.

BAN, BAN'US, or BAN'NUS (from the Slavonian *ban*, a chief), was the name given to the governor of certain military districts in Slavonia and Croatia, in the kingdom of Hungary, who was the representative of the sovereign, and in virtue of his office took the command for the defence of those districts in time of war. A district over which such a ban or ruler was set was hence termed a Banate or Banat. There were two of these banates in Hungary, the *Hungarian Banate* and the *German Banate*; but on the erection of the vassal lands into crown lands in 1849, the banate ceased to have any political connection with Hungary.

BANANA and PLANTAIN are varieties of *Musa paradisica*, which is one of the most useful products of tropical countries. Three dozen fruits will maintain a person, instead of bread, for a week, and appears better suited to him in warm countries. Indeed the banana or plantain is often the whole support of an Indian family. The fruit is produced from among the immense leaves in bunches, weighing 30, 60, and even 100 lbs., of various colours, and of great diversity of form. It is usually long and narrow, of a pale-yellow or dark-red colour, with a yellow farinaceous flesh. But in form it varies to oblong and nearly spherical, and in colour offers all the shades and variations of tints that the combination of yellow and red in different proportions can produce. Some sorts are said always to be of a bright-green colour. In general the character of the fruit to a European palate is that of mild insipidity; some sorts are even so coarse as not to be edible without preparation. The greater number, however, are used in their raw state, and some varieties acquire by cultivation a very exquisite flavour, even surpassing the finest pear. In the better sorts the flesh has the colour of the finest yellow butter, is of a delicate taste, and melts in the mouth like marmalade. In the West Indies bananas are even more extensively employed than in the East. The modes of eating them are various. The best kinds are served up raw at table, as in the East Indies, and have been compared for flavour to the best varieties of the apple. Sometimes they are baked in their skins, and then they taste like the best stewed pears of Europe. They are also the principal ingredient in a variety of dishes.

The banana prefers a rich fat soil; for in sandy places, where it flowers abundantly, it produces no fruit. The banana is the variety used as a fruit; the plantain is larger,



Banana (Musa paradisica).

and is better when cooked. Humboldt calculated that an acre of plantains would supply more food than could be got from the same extent of ground by any other known plant.

BAN'ATE, a frontier district in the S.E. of Hungary with an area of 8648 square miles; population, 1,100,000. It was formerly marsh and forest, but is now well cultivated and prosperous. The inhabitants are the descendants of persons of various nationalities, who were induced to settle in the country for the purpose of reclaiming it. The chief town is Temeswar.

BAN'BRIDGE is a thriving town in the county of Down, Ireland, on the north-eastern bank of the river Bann, which has become the chief seat of trade for the linen manufacture of the district. It is 23 miles S.W. of Belfast on the railway from Belfast to Dublin, and is built on the summit and sides of a hill of some height, and so steep as materially to impede the progress of heavy-laden carriages. To remedy this inconvenience, the centre of the road was cut down for a length of 200 yards, to the depth of 15 feet in the middle part of the section, so as to form a carriage-way nearly level, while the great breadth of the street still admitted carriage-ways on each side on the original level, a communication being maintained between the houses on the opposite sides of the street by a bridge or viaduct. The town is neat and well arranged, with many good houses and shops, and a handsome market-house. It contains several spinning and weaving mills and bleaching greens. There are also large thread factories and chemical works. In the centre of the town is a splendid monument to Captain Crozier, the second in command under Sir John Franklin in the Arctic expedition. Population, 5609.

BAN'BURY, a market-town and municipal and parliamentary borough in Oxfordshire, 22 miles N. from Oxford, and 78 from London by the Great Western Railway, is situated on the west bank of the Cherwell, in the centre of the rich red loam of Oxfordshire. The neighbourhood is thickly covered with villages. The town is situated in a valley, almost surrounded by rising ground. Most of the streets are wide and airy, and a complete system of drainage has been carried out. The town-hall is modern; there

is also a new corn-exchange, and a hall of art and science. The old church was taken down in 1790, and a new and more spacious edifice erected. A new church has been built at Neithrop, near the town. A very elegant Wesleyan chapel was erected in 1864, and another, somewhat in style, in 1872. There are also various other places of worship for dissenters. The Horton Memorial Hospital, a large and handsome building, was opened in 1872. The ancient cross, now destroyed, is immortalized in the well-known nursery rhyme. The agricultural implement and machine manufactory of Messrs. Samuelson is extensive and flourishing, and webbing is also made to a considerable extent. There is also a large woollen tweed factory. The town is famous for the well-known Banbury cakes, which were renowned in the time of Ben Jonson, and also for its ale. The municipal borough had a population of only 3600 in 1881. The parliamentary borough, which returned one member up to the year 1885, comprises the parish of Banbury, which extends into Northamptonshire; its population in 1881 was 12,072.

Banbury was incorporated by Queen Mary, whose charter was confirmed by James I. and George I. At Edgecot, or Damesmore, near Banbury, during an insurrection, the army of Edward IV., under the Earl of Pembroke, was defeated on 26th July, 1469, and their leader and his brother were afterwards taken prisoners and executed.

BAN'CA, an island in the Indian Ocean, lying off the north coast of Sumatra, near to its eastern extremity, from which it is separated by the Straits of Banca. The island measures in its greatest length from N.W. to S.E. 135 miles, and in its broadest part is 65 miles; the mean breadth is 35 miles. The total area is thus about 5000 miles. It lies between $1^{\circ} 30'$ and $3^{\circ} 8'$ S. lat., and $105^{\circ} 9'$ and $106^{\circ} 51'$ E. lon.

Banca had always formed a dependency of the sultans of Palembang, in Sumatra, but in 1812 it was formally ceded to the East India Company. In 1816 the island was made over to the King of the Netherlands, in exchange for the settlement of Cochin on the Malabar coast. The island does not contain any continued chain of mountains, but in every part are found short ranges of lofty hills. The whole of Banca is abundantly supplied with water of good quality. Almost the only town on the island is Muntak, which is situated on the western coast, and contains rather more than 3000 inhabitants.

Banca derives its importance, in a commercial point of view, from its tin-mines, which were first discovered in 1710, and have since yielded immense quantities of ore; they appear, in fact, to be inexhaustible. The geological formation of the island is a primitive rock, the principal mountains being granite, and those of inferior elevation being formed of red iron-stone; it is in the level ground between these rocks that the tin is generally found, in alluvial deposits, seldom lower than 25 feet from the surface. The ore (an oxide), after being washed in the nearest mountain stream, is smelted, and yields in various proportions from 30 to 70 lbs. of tin for every 100 lbs. of ore; the more usual proportion is about 60 of metal to 100 of ore.

From the time of their first discovery, the tin-mines of Banca have been worked by Chinese, whose numbers have been annually recruited. The quantity of tin procured was about 3,000,000 lbs. annually at the time of cession to the Dutch, since which it has largely increased, and is now nearly 10,000,000 lbs. After fully supplying the markets of China and India, a large quantity is annually sent to Europe. Iron, copper, lead, silver, and arsenic are also found in the island.

The climate is very unhealthy for Europeans. Except during the four months, from May to August inclusive, when the south-east monsoon blows, rains are very frequent on the island, especially from November to February, which is the season of the north-west monsoon. Ebony and other

timber trees are found on the island. Deer, wild hogs, and fish are among the animals of the island; but the soil is generally dry and stony, and both animal and vegetable food are largely imported.

The population of Banca is made up of Malays, Chinese, and indigenous islanders, and numbers altogether about 63,000. Almost all the laborious occupations are performed by the Chinese.

BAN'CO, SITTINGS IN, a phrase derived from the barbarous Latin *bancus*, literally a bench or high seat, hence a seat of judgment. The judges in the superior courts of common law were called justices of the bench, or, as they are always styled in records, *justicarii de banco*. This term formerly denoted the judges of a peculiar court held at Westminster, which is mentioned in records of the reign of Richard I. This court no doubt derived its name from its stationary character, being permanently held at Westminster, whereas the *curia* or *aula regis* followed the king wherever he went.

The phrase of *sittings in banco*, or in *bauc*, denotes the sittings during the law terms, when the judges of each court sit together upon their several benches. In this sense it is used by Glanville, who enumerates certain acts to be done by justices *in banco sedentibus*. *Days in banc* are days appointed by the courts, or fixed by statute, when process must be returned, or when parties served with writs are to make their appearance in full court.

BAN'CROFT, RICHARD, Archbishop of Canterbury in the reign of James I., was born at Farnworth, Lancashire, in September, 1544. He was first a student of Christ's College, Cambridge, and in 1567 he took the degree of B.A. He afterwards removed to Jesus College, and commenced M.A. in 1570. After having passed through various steps of preferment, he was consecrated bishop of London in 1597. From this time he had in effect the archiepiscopal power; for the archbishop, being advanced in years and unfit for business, committed the sole management of ecclesiastical affairs to Bishop Bancroft. In 1604, upon Whitgift's death, he was promoted to the archbishopric of Canterbury; and in 1608 was elected chancellor of the University of Oxford, in the room of the Earl of Dorset. He died on the 2nd of November, 1610, in his palace at Lambeth. Bancroft was a learned controversialist, an excellent preacher, a great statesman, and a vigilant governor of the church. He was, however, rigid in his treatment of the Puritans, and on that account has been spoken of with some severity. He took the chief part in King James' translation of the Bible.

BAND, in architecture, a flat moulding with a vertical face slightly projecting beyond the vertical or curved face of any moulding or parts of an edifice to which it is attached. It is extensively employed, and is used to give an appearance of binding parts of buildings together.

BAND (also written *Bund* or *Band*), the Persian word for a dyke or artificial embankment, frequently occurs as a component part of names in eastern geography; for instance, in the name of the Persian river Band-Emir, a branch of which passes near the ruins of Persepolis.

BAND, in music, a combination of performers on various musical instruments. This is only a special use of the word, which means simply a company of men, as with the French *bande*, and our own word *band* in such phrases as a "band of robbers," &c. The word comes from *bind*, and is found in all the chief Aryan tongues back to Sanskrit *bandh*, with the same meaning (Aryan root, $\sqrt{\text{BHANDH}}$). We first meet with the word in its musical sense, as "*la bande de 24 violons*," under Louis XIV. of France. This band was imitated afterwards by Charles II. of England, and no doubt the French name came over with the French musicians, for it is mentioned in a paper of the royal household in 1661, the year after Charles' accession. The word nowadays tends more and

more to get further specialized into the meaning of a military or "brass" band, other companies of musicians being now generally termed an orchestra. The words "string band" and "wind band" have a special meaning in musical composition, the first including all the bowed instruments in an orchestra (sometimes called the string-quartet), and the second all the blown instruments. The "wind band" is further divided into the "wood wind" and the "brass." For the employment of these together and in contrast see **INSTRUMENTATION**.

BANDA, a district in the Lieutenant-governorship of the North-western Provinces of India, lying between 24° 53' and 25° 55' N. lat., and between 80° 2' and 81° 36' E. lon. The area is 2908 square miles, and the population 700,000. Banda is a district of the Allahabad division, and is bounded on the north-east and north by the river Jumna (Jannum); on the west by the river Ken, the district of Hamirpur, and the native state of Gaurihar; on the south and south-east by the native states of Panua, Charkhari, and Rewah; and on the east by Allahabad district. Its southern boundary is intersected by outlying portions of the surrounding native state.

The district consists of a finely varied country, sloping downwards from the Vindhyan range on the south-east to the valley of the Jumna and the Ken on the north and west. The southern or highest portion is composed of the rugged granite hills which form the northward escarpment of the great central Indian table-land. To the north of this hilly region lies a tract of undulating plains, at first thickly sprinkled with granite boulders, similar to those on the hills, but gradually diminishing in size and numbers towards the valley of the Jumna. The Jumna valley rises by a series of terraces, broken with ravines, to the level of the table-land above. The soil of the low ground is chiefly the black variety known as *mar*, which has a singular power of retaining moisture, and is very fertile. As the tributary rivers are confined within wide and deep-cut channels, they are not liable to overflow their banks; but the Jumna inundates and fertilizes its own immediate valley. The whole district is moderately well wooded. Antelopes, elks, and ravine deer are plentiful; hyenas common; tigers rare; snakes are numerous.

The principal produce consists of wheat, maize, gram, and jowar, a kind of millet. The crops of the district are of two classes—the autumn harvest, for which the sowing takes place from June to August; and the spring harvest, sown in November or December. Of the former the principal crop in value, though not in acreage, is cotton. Hemp and millet are generally sown with it. The chief spring crops are wheat; gram and maize oil-seeds are also largely grown. Great quantities of bamboos are exported.

The district of Banda is specially exposed to the ravages of insects, of which there are no less than sixteen destructive species. They attack the wheat, rice, gram, and other grains, and one in particular attacks the cotton. Some of them destroy as much as three-fourths of the crop. The district also suffers much from drought.

Banda being a poor agricultural district has little trade. The Jumna is its main artery. The Banda cotton is sufficiently well known in commerce to be called by its prefix as a trade name. Polished pebbles, found in the Ken, and cut into knife handles, brooches, seal rings, and other ornamental articles, are exported in considerable quantities. There are several quarries in the southern hill country, which export durable sandstone for ornamental architecture, and other stone for metalling roads and for railway purposes. Iron is also found near Kalingar, and worked by companies of blacksmiths. The Jabulpore (Jabalpur) branch of the East Indian Railway traverses the district.

The cold season in Banda is less intense than that of the neighbouring districts, frost being very rare. The hot weather sets in about the middle of March, and the crops

are cut by April. The atmosphere is distinguished by its clearness, fog and dust being almost unknown. The beautiful phenomenon of the mirage is often observed. On the other hand, this purity of the air contributes to the heat, and many deaths occur from exposure to the sun.

BANDA, the chief town of the above district, stands on an undulating plain, about a mile east of the right bank of the river Ken. It is about 95 miles south-west from Allahabad, 190 miles south-east from Agra, and 560 miles north-west from Calcutta. The modern town derived its first importance from its residence of the Nawab of Banda, and later on from its rising position as a cotton mart. After the removal of the Nawab in 1858, owing to his disloyalty during the mutiny, the town began to decline, while the growth of Rajapur, as a rival cotton emporium, has largely deprived Banda of its principal trade. The population thus decreased from 42,411, which it was in 1853, to 22,000 in 1882.

BANDA ISLANDS, a small group of islands in the Malay Archipelago, about 45 miles S. from the island of Ceram, are situated between 4° 22' and 4° 33' S. lat., and 129° 41' and 130° 8' E. lon. There are in all ten islands, of which Banda-Neira, Banda-Lantour, Gonong-Apee, and Pulo-Ay, or Way, are the most important. The others are Rossengen, Pulo-Rondo, Soangee, Pulo-Pisang, and Capella, besides several rocky islets. The area of the whole group is only about 190 square miles. These islands produce the nutmeg almost exclusively, whence they are frequently called the Nutmeg Islands, in contradistinction to the Amboynas, which yield the clove.

A settlement was first made in these islands by the Portuguese about 1520, and about sixty years afterwards they were expelled by the Dutch. The English afterwards obtained a settlement, and there was much contention between the two nations till 1816, when the possession of the islands was finally given by the English to the Dutch, who still retain them.

Banda-Neira is the seat of the Dutch government. The anchorage is formed by Banda-Lantour on the south, Banda-Neira and Gonong-Apee on the north, with Pulo-Pisang and Capella at the west entrance. All the islands are volcanic, and Gonong-Apee, or the Burning Mountain, smokes almost continually, and occasions frequent earthquakes. Besides regular forts, there are a number of redoubts and military posts all round these islands, to prevent smuggling.

The population of the Banda Isles is about 112,000, including a large number of Malay and Chinese labourers. The population of Banda-Neira is 6000.

BANDA ORIENTAL, a portion of the former viceroyalty of Buenos Ayres, in South America, one part of which was incorporated with Brazil in 1828, and the latter became independent as the republic of URUGUAY.

BANDAGE is a term employed in surgery to designate the bands or strips of cloth by which dressings are kept to wounds, separated parts are brought together, bloodvessels compressed, and weak and protruding parts of the body are supported and retained in their natural position. Bandages are commonly composed of flannel, calico, and linen cut into different shapes, according to the parts to which they are applied, and the purposes for which they are required—the most common form consisting of a strip of calico from 3 to 5 inches in width and 6 yards in length, rolled longitudinally, and called from this a "roller." This is principally used in the case of wounds in the limbs or about the head. When applied to the leg it is usual to begin with the foot, which is raised and the bandage secured round the ankle by crossing the ends in front. It is then carried beneath the foot, and again round the ankle once or twice, and then around the leg, each turn overlapping about a third of the previous one. When the calf is reached the bandage must be turned down on the outer side of the limb, in order that

it may lay flat and smooth and fit properly. The arm is bound up in a similar manner, the baudage being secured round the hand and continued up the wrist, and then turned back on itself in figure-of-eight loops for the forearm. Wounds of the scalp require the hair on the edge to be cut away, and the lint or plaster applied may be secured by a turn or two round the head and over the top, passing down under the chin. Another bandage used for the head consists of a piece of cloth split up into four tails or corners, which are crossed and tied so as to make a cap. The fingers or toes may be bandaged with broad tape; and in the case of a fractured rib a broad flannel bandage is required, which is wrapped round the chest. Care must be taken not to interfere unduly with the circulation of the blood by too great pressure, or the bandage will do harm instead of good.

BANDANAS, a name originally applied to a peculiar kind of silk handkerchief made by the Hindus, is now given to silk and cotton handkerchiefs manufactured in this country, decorated with patterns of similar character, though by a very different process. A bandana handkerchief has a dyed ground, usually of bright red or blue, ornamented with circular, lozenge-shaped, or other simple figures, either white, or in some cases of a yellow colour. These spots are said to be produced, in real Indian bandanas, by tying up the parts intended to be white or yellow with bits of thread before exposing the handkerchief to the action of the dye, and thus protecting them from it. In the process followed by British manufacturers, which was invented in 1810 by M. Köchlin of Mülhausen, the whole surface of the handkerchief is dyed of one uniform colour; a number of pieces thus dyed are laid between two leaden plates, perforated with holes wherever white spots are intended to be, and while the several thicknesses of cloth are compressed in this manner by the power of a hydraulic press, a fluid capable of discharging the dye is caused to percolate through the holes in the leaden plates, removing in its passage the dye from such parts of the cloth as are exposed to its action. By varying the discharging fluid the spots may be made yellow instead of white; and arrangements are sometimes made for combining white and yellow spots in the same handkerchief.

BANDEL, ERNST VON, an eminent German sculptor, was born at Anspach, Bavaria, 17th May, 1800. He studied at Munich, displaying such early talent that in 1820 he exhibited a life-size figure in plaster of Mars, reposing, which at once gave him a high reputation. Another figure which has been much admired is that of Charity. His masterpiece consists of a colossal statue (10 feet high) of Hermann, the ancient German hero, which has been cast in copper, and now stands on a hill overlooking Detmold, in Lippe. The foundations were laid in 1841, but the statue was not unveiled until 1875.

BANDELLO, MATTEO, was born in the latter part of the fifteenth century. He lived to an advanced age, but the year of his death is not known. Bandello holds a rank in Italian literature on account of his "Novelle" or tales, written somewhat after the manner of those of Boccaccio, though in less pure Italian. But in fluency of narrative and vividness of description Bandello rivals, and even surpasses at times, the Tuscan novelist. The plot of Shakespeare's "Much Ado about Nothing" is taken from Bandello. On the score of morality, many of his tales are as impure in tone as those of Boccaccio. The chief edition of Bandello's novels is that of Lucca, 1554, in three vols. 8vo.

BANDE NOIRE (Black Band). This appellation was first given to a body of German foot-soldiers, who were employed in the Italian wars by Louis XII. of France, in consequence of their carrying black ensigns after the death of a favourite commander. Another body of troops, formed of Italians, afterwards took the same name from the same cause, on occasion of the death, in 1526, of their leader

Giovanni de' Medici; and still later the French regiment of Piedmont, who had served for a long while in Italy, followed the same example after the death of their colonel, the Comte de Brissac, in 1569.

Another and quite different use of this title was made during the first French revolution. The lands and buildings belonging to the church, and to the noble families that had fled from the country, were confiscated and put up for sale by the different factions that gained ascendancy, and these were purchased by capitalists acting individually or in combination. Having gained possession they sought to turn their acquisition to the best advantage, and ruthlessly destroyed many of the churches, convents, abbeys, episcopal palaces, &c., some of which were of considerable antiquity and historic interest. The term Black Band, as a title of reproach, was in consequence used in speaking of these men; but their work has been defended by many writers, who affirm that the buildings destroyed could well be spared, and that the division and sale of the large estates has resulted in the rise of the thrifty and industrious peasant farmers who form so important an element in the French nation.

BAND-FISH (*Cepola*) is a genus of ACANTHOPTERYGII belonging to the same division as the BLENNY (see Plate BLENNY). The band-fishes are found in the Japanese seas, the Indian Ocean, and the Mediterranean. The body is long and compressed, measuring from 15 to 20 inches, and is covered with very small scales. There is one very long dorsal fin, which, like the anal, is composed of soft rays. The European species (*Cepola rubescens*) is found on the British coasts, but in no great abundance. The band-fishes are of a brilliant red colour, and their motion through the waters in large numbers presents a very beautiful appearance. This fish is also known as the Red Riband and the Fire-flame.

BANDICOOT (*Perameles*), a genus of MARSUPIALIA peculiar, with one exception, to Australia, where they appear to represent the shrews, hedgehogs, and other Insectivora of the older continents. These animals are all of small size, the largest known being scarcely equal in bulk to the common hare. In the structure of the hind feet the species of this group greatly resemble the kangaroos, but there is less disproportion between the fore and hind limbs, and they do not proceed by a series of vigorous leaps, but much in the manner of the hare or rabbit. The outer toes are very short, almost rudimentary, and placed far back. The other toes are all furnished with powerful claws, enabling their possessors to dig and burrow with facility. The head is elongated, with a pointed naked muzzle. The marsupial pouch of the female has, unlike that of the kangaroos and the rest of the order, the en-



Long-nosed Bandicoot.

trance directed downwards towards the tail. The structure of their teeth is of a carnivorous type, there being four well-developed canines, sixteen incisors—ten above and six below—twelve premolars, and sixteen molars. The teeth are adapted for an insect diet, but these animals feed also upon roots and other vegetable substances.

The long-nosed bandicoot (*Perameles nasuta*) is about a foot and a half in length, with moderate pointed ears, an elongated muzzle, and a long slender tail. The fur is of a brownish-gray tint, passing into white on the under parts of the body.

This species is herbivorous. It uses its sharp and strong fore claws for the purpose of digging up roots, and like the rat frequently invades granaries, committing sometimes no trifling mischief.

BAN'DICOOT RAT (*Mus gigantus*) is a huge rat inhabiting India, Ceylon, and the Malayan peninsula, and measuring 14 inches in length exclusive of the tail. It is a very mischievous animal, undermining houses and places where stores of grain are kept, and committing great havoc in gardens and plantations, besides sometimes attacking the poultry. The coolies of India are very fond of its flesh, which is said to resemble pork. See RAT.

BANDIE'RA, ATTILIO and **EMILIO**, two brothers, born at Venice, the former in 1810 and the latter in 1815. Their father was a rear-admiral in the Austrian navy, and they were both brought up to the same profession. Nevertheless, they hated the uniform they wore, and believed that it was their duty to assist all Italians in their efforts to free their country from foreign subjugation. In 1844 they endeavoured to incite a rising in Calabria, against the wish of Mazzini, who felt certain it would be unsuccessful, and was anxious that such valuable lives should be spared. Their letters to Mazzini were opened at the English Post Office, and the design communicated to the Neapolitan government, who, by means of spies and pretended friends, led the brothers on to their ruin, by representing to them that the rising would be sure to succeed. Whilst proceeding to Calabria they were surrounded and captured by an overwhelming force. Together with seven companions they were shot in the market-place of Cosenza on the 25th of July. Their tragic fate excited general sympathy in England, and the government of the day incurred much obloquy in consequence of the part they had taken in bringing it about, by opening the letters.

BANDINEL'LI, BARTOLOMME'O, commonly called *Baccio Bandinelli*, was born at Florence in 1487. Baccio was early taught drawing in his father's house, and was afterwards placed as a pupil with Giovanni Francesco Rustici, an eminent sculptor. He executed many groups and statues in marble and bronze, several of which still remain in the palaces and churches of Florence, Rome, and other cities of Italy. Bandinelli was undoubtedly a sculptor of great ability, admirable in design, though somewhat hard and imperfect in execution. He died at Florence in 1559. An engraving of one of the best known of Bandinelli's figures will be found in the Plate SCULPTURE.

BANDIT'TI. This word, though seldom used by the Italians in our sense for "hands of robbers," is derived from the Italian verb *bandire*, to banish or put to the ban, whence the participle *bandito*, banished or outlawed, and the substantive *bandito*, an outlawed man (plural *banditi*, or outlawed men). [See BAN.] Correctly, therefore, the word should not be banditti, but banditi. The term seems to have been introduced into our language at least as early as the time of Shakspeare; but whoever first imported it, and confined its signification to robbers, departed from the original extensive sense of the word, which means a man banished on any account. In the south of Italy, the only part of the peninsula where such lawless associations have existed for many years, the robbers are popularly called *briganti*, and never banditti. These organized bands of robbers were until recently fostered in Italy by the mountainous nature of a great part of the peninsula, by the division of the country into small states—which too often enabled the robbers, by crossing a frontier, to put themselves in safety—by frequent revolutions, and by weak governments. In modern days, however, their excesses

were confined chiefly to Lower Italy, and for some time they gave great trouble to the government of Victor Emmanuel in certain districts of Naples, but successful measures were ultimately taken by the government to repress these outrages throughout the entire peninsula. In Sicily brigandage still unhappily continues, though to far less extent than heretofore.

BAN'DOLIERS. See ARMS.

BAN'DON, a market town and parliamentary borough of Ireland, in the county of Cork, is situated on the river Bandon, 19 miles S.S.W. from Cork. It is a well-built town situated on the declivities of the hills on each side the river, which blend into a richly wooded valley. There are a few manufactures of woollens, cottons, whisky, leather, and flour, and a limited trade is carried on by means of the river, which is navigable for barges to Inishannon, 4 miles from Bandon. The population in 1881, including the suburb of Roundhill, was 5949. The parliamentary borough, containing 447 acres, returns one member. The number of voters in 1884 was 440.

BANFF, a seaport, a royal burgh, and the chief town of Banffshire, is situated on the west side of the Dovan, near the entrance of that river into the Moray Frith. It is 125 miles N. of Edinburgh, and 50 from Aberdeen by the Great North of Scotland Railway, of which it is a station. The town consists of two parts, which are completely separated by a piece of table-land lying midway between them, and on which stands Banff Castle, a plain modern building erected on the site of an ancient castle. The harbour is at the western extremity of a semi-circular bay, at the eastern extremity of which is the suburb of Macduff, which has a better harbour than that of Banff itself. Banff was erected into a royal burgh in 1372. The town contains several places of worship, a town-hall, several schools, county buildings erected in 1871, lunatic asylum, and the Chalmers Hospital, a large and handsome Gothic building erected in 1862. There is a stone bridge of seven semi-circular arches over the Deveron.

The number of vessels registered as belonging to the port in 1885 was 120 (20,000 tons). The entries and clearances average 450 (40,000 tons per annum). The chief exports consist of corn, cattle, salmon, cod, and herrings. The herring fishing is carried on to a great extent, and on the whole with success. The manufactures are confined to linen, stockings, soap, and leather. Banff forms one of the Elgin district of burghs, which returns one member to the House of Commons. In 1881 the population of the town and parish was 5218, of the parliamentary borough, including the suburb of Macduff, 7844—an increase of 405 from 1871. The number of electors in 1884 was 950.

The natural situation of Banff is extremely beautiful, having its south-eastern exposure on a gentle slope, the wide blue sea on its N., the river Deveron on the E., and on the S. the richly wooded country, with the magnificent mansion and grounds of the Earl of Fife. The streets are well and regularly built and paved, and kept very clean.

The Carmelites, or White Friars, had a convent in Banff, but at what precise period it was instituted cannot be ascertained. The castle of Banff was a constabulary or lodging for the king when visiting this part of his dominions, and in his absence it was inhabited by the thane or constable who administered justice in his name. It was essentially royal property, and continued so till the middle of the fifteenth century, when James Stuart, earl of Buchan, brother of James II., was created heritable thane, the castle of Banff being at the same time bestowed on him as the official messuage of his family. Banff gave the title of peer to a branch of the family of Ogilvie, which became extinct in 1803, on the death of the eighth Lord Banff without male issue. The Duke of Montrose plundered Banff in 1645, and the Duke of Cumberland's troops

passed through the town in 1746 on their way to Culloden. The names of two persons, eminent in very different walks of life, are connected with Banff. The famous James Sharp, who was originally a keen supporter of Presbytery, and who, having betrayed that faith, rose to the archiepiscopal see of St. Andrews, was a native of Banff, his father being sheriff-clerk of the county. He was assassinated on Magus Moor, near St. Andrews, in 1679. James Macpherson, having followed the lawless and predatory life of a gipsy, was apprehended (1700), tried, and condemned to be hanged at Banff. He was proficient as a player on the violin; and when brought to the place of execution he carried his instrument along with him and played his own march, which had been composed by himself while in prison. This composition was published after his death, and has ever since been a favourite in Scotland. Burns wrote a new and improved version of the song, which is known under the name of "Macpherson's Lament," or "Macpherson's Farewell."

BANFFSHIRE, a county in the north of Scotland, comprehending the districts of Strathdoonan, Boynie, Enzie, Strathaven, Balvenie, and part of Buchan. It was a sheriffdom at least as early as the time of King David I. It lies on a long slope between a range of the Grampian Hills and the Moray Frith. It is bounded on the S. and S.E. by Aberdeenshire, on the W. by Elgin, and on the N. by the Moray Frith. Banffshire contains 686 square miles, or 439,219 acres. The face of the country is agreeably diversified with hills and dales, woods and rivers. For about 30 miles along the coast the soil, which chiefly consists of sand and loam, is excellent, and produces heavy crops. The coast is mostly rocky, but not high. The southern part of the county is chiefly mountainous, and is consequently pastoral rather than agricultural. Even here, however, there are many beautiful and fertile valleys. In the upper or hilly districts there are large tracts of land peculiarly adapted for grazing. These are for the most part well sheltered with natural wood, and abundantly watered by the rivers and streams with which the county abounds. The Spey, which is one of the largest rivers in Scotland, and the most rapid, runs along a considerable part of its western boundary, and the Deveron falls into the sea near its eastern extremity. The Aven, a branch of the Spey, rises in the south-western angle of this county.

Some of the mountains in Banffshire are among the highest in Great Britain. Cairngorm is 4080 feet above the sea-level. Ben Macdui (4296 feet) is partly in the county. The rocks of the county are mostly of old formations, and in various parts are found mineral veins, fluor spar, rock crystal, hones or whetstones, and fossil remains imbedded in blue clay. Many patches of metamorphic limestone and of serpentine occur. The latter at Portsoy has long been famous as the "Portsoy marble."

Agriculture is in general conducted on the best principles, and improved implements are readily adopted. Much waste land has been reclaimed in recent years. The cattle and stock of every kind are also of the best breeds that can be procured. According to the official agricultural statistics published in 1885 there are 168,000 acres—or about two-fifths of the entire area—under cultivation. The chief crops are—oats, 53,000 acres; turnips, 25,000; clover and other grasses under rotation, 66,000; and permanent pasture, 10,000. The number of cattle in the county is 40,000, and of sheep 50,000.

The climate is variable. Along the coast it is dry and genial, and the crops consequently ripen well; but in the mountainous districts the climate is cold and humid, and the harvest in those parts is therefore late.

The manufactures in Banffshire are inconsiderable. The principal are weaving, bleaching, flux-dressing, tanning, and distilling. The salmon fishing, especially in the Spey,

is very successful, the take in some years having amounted to the value of £100,000. There are also some extensive herring fisheries on various parts of the coast. The shipping trade is considerable for the extent of the county. It is chiefly carried on at the ports of Banff, Macduff, Portsoy, and Gardentown. The exports principally consist of grain, meal, black cattle, swine, and other live stock. The imports are, for the most part, timber, coals, iron, &c.

In Banffshire there are numerous noblemen's and gentlemen's seats; that of Gordon Castle, belonging to the Duke of Richmond, is generally admitted to be the finest in the north of Scotland. There are also many remains of antiquity, such as the ruins of the ancient castle of Findlater, the castles of Deskford, Galval, and Balvenie, the churches of Mortlich and Gannrie, and several cairns. The church of Gannrie was built in 1010, and used for public worship till 1830. It is called the "Kirk of Skulls"—the bones of the Norsemen who fell on the neighbouring field of Bloody Pots having been built into its walls.

Banffshire sends one member to the House of Commons. The population in 1881 was 62,736, an increase of only 713 as compared with 1871.

BANGALORE (*Bengaluru*). The district of Bangalore forms the southern portion of the Nundydroog (Nandidrug) division of the Mysore State, British India. It lies between 12° 15' and 13° 57' N. lat., and between 77° 9' and 78° 38' E. lon., being bordered on the south by the Madras districts of Coimbatore and Salem. It contains an estimated area of 2914 square miles, and has a population of 850,000.

The main portion of the district consists of the valley of the Arkavati river, which joins the Cauvery (Kaveri) on the southern frontier; the eastern part is watered by the South Pinakini. Towards the west the country is broken by a succession of rugged hills and deep valleys; the remaining tract, which is open and undulating, forms part of the general table-land of Mysore, attaining at Bangalore town an elevation of 3050 feet above the sea. The low-lying lands are dotted with tanks for irrigation, varying in size from small ponds to considerable lakes, formed by embanking the minor streams. The uplands are often bare, or covered with low scrub jungle. The prevailing soil is the kempu, a loam of great fertility, varying in colour from a light red to a deep chocolate; the darker sorts are caused by the weathering down of the trap rocks. State forests cover an area of about 32 square miles, and avenues have been planted along all the public roads.

The principal cultivation of the district consists of "dry" crops, rice being comparatively neglected. The great food staple is razi (*Cynosurus coccanus*), which also furnishes the necessary fodder for the cattle. Various millets and pulses are grown, and a little wheat. The chief oil-seeds raised are gingelli (*Sesamum orientale*) and the castor-oil plant. Opium and poppy are cultivated in certain tracts. The most valuable of the "wet" crops is sugar-cane, which requires to be well cared for and highly manured. Vegetables, both of indigenous and European sorts, are largely grown for the markets of Bangalore and Madras; and the example of the Lal Bagh in Bangalore town has led to the introduction of many flowering plants from England. The cattle are of an excellent breed, and the rearing of bulls for sale forms a favourite occupation of well-to-do rayats. Sheep and goats thrive well: the wool, however, is of a coarse description, and only used for the manufacture of native blankets and horse rugs. An attempt made by the government to introduce the merino breed of sheep did not prove successful. The manufacture of cotton cloth and coarse woollen blankets, or kambis, is a common industry in all parts of the district. The finer sorts of cloth are woven with some admixture silk and with silk borders.

The climate of Bangalore town and the surrounding

country is noted for its healthiness, but in the hilly jungles towards the west and south malarious fever is endemic. The mean annual temperature is 76.2° , the extreme range in any single year having been 42° . The average annual rainfall is 36 inches, distributed over about ninety days. The heaviest fall generally occurs during the prevalence of the north-east monsoon in October; from December to May there is usually little or no rain. The most prevalent disease is malarious fever, frequently attended with enlargement of the spleen; it is most common at the beginning and close of the monsoons. Small-pox is always more or less prevalent during the hot season and at the commencement of the rains, though vaccination is now systematically conducted in every taluk. Pneumonia in natives and congestion of the lungs in Europeans are common.

In 1791 Bangalore was captured from Tipu Sultan by the British under Lord Cornwallis, without much opposition; the other strong places surrendered, and the rock fortress of Savandurga was stormed after five days' bombardment. On the capture of Seringapatam and the death of Tipu, in 1799, the district was included by the treaty of Seringapatam within the territory of the restored Hindu raja of Mysore. In 1811, owing to the excessive unhealthiness of Seringapatam, the British troops were removed to the town of Bangalore, which has since continued to be the administrative capital of the state, though the raja still resides at Mysore.

BANGALORE CITY (*Bengaluru*, literally "town of bennah," a kind of bean) is the chief town of the district, and the capital of the state of Mysore. It is 71 miles N.E. of Seringapatam, and 216 miles by rail W. of Madras. The city is divided into two parts—the Pettah, or old native quarter, including the fort; and the cantonments. Beyond the latter is the suburb of St. John's Hill, or Cleveland Town, dotted with the little cottages of a large number of European pensioned soldiers, which, with the spire of its parish church, presents somewhat the appearance of an English village. The large open space between the two native quarters contains the racecourse, the Cubbon Park, and the parade ground. Here also are situated the chief government offices and the houses of the European residents, each encircled by its own green compound. The fort, which is oval in shape, is said to have been originally built in 1537, with mud walls, by a local chieftain. The present fortifications of stone were constructed by Haider Ali in 1761. When the British assumed the direct administration of Mysore, in 1831, the principal departments of the government found accommodation in the palace inside the fort. In 1868 new offices were erected in the cantonments, and the old palace, a large two-storied building of mud, has fallen into decay. The old native quarter is very densely populated. The streets are for the most part narrow and irregularly built, but there are a few handsome houses owned by wealthy merchants. The trade is generally brisk, especially in the grain and cotton markets; and altogether the Pettah presents the appearance of a prosperous Oriental city. In the extreme north of the town the maharaja has a handsome palace of new stone. There are altogether eight churches of the different Christian denominations, and many Hindu temples and Mohammedan mosques. The city of Bangalore is the headquarters of the Mysore division of the Madras army, and contains separate barracks for artillery, cavalry, and infantry, as well as Sepoy lines. The Lal Bagh, about a mile east of the fort, is a beautiful pleasure garden, said to have been first laid out in the time of Haider Ali. It is now under the charge of a European superintendent from Kew, and contains a rare collection of tropical and sub-tropical plants.

Under British administration Bangalore has greatly prospered, both in commercial wealth and the outward marks of civilization. It now ranks next after Allahabad

as the tenth town, in point of population, in British India. A regular water supply is provided from numerous large tanks, and the sewage is conveyed away to be utilized on municipal farms. Population, 150,000.

BANGKOK, the capital of the kingdom of Siam, is situated on both banks of the river Menam, about 20 miles from its mouth, in $13^{\circ} 40'$ N. lat., $101^{\circ} 10'$ E. lon. The city extends along the banks of the Menam for nearly 7 miles. On the left bank there is a long row of floating houses, each house or shop consisting of a distinct vessel, which may be moored at any place along the banks. Besides the Menam, which at Bangkok is about a quarter of a mile wide, there are numerous tributary streams and canals, so that almost all intercourse is by water.

The land portion of the city, which is chiefly on the eastern bank, is entirely built of wood, except the palaces of the king, the temples, and the houses of some of the ministers, which are constructed of bricks or with mud walls. The houses are built on posts driven into the earth and raised 6 or 8 feet above the ground—a precaution rendered necessary by the daily tides, and the annual inundations to which the town is exposed. A boat, generally a small one, is attached to each house, whether floating or not, for the use of the family. Horses and carriages are rarely seen. The situation has gained for Bangkok the name of "the Venice of the East."

The palace of the king is contiguous to the town, on the left bank of the river, but higher up the stream. It is situated upon an island from 2 to 3 miles in length, but of inconsiderable breadth, which is separated from the continent by a narrow arm of the river. The palace, and indeed almost the whole of the island, is surrounded by a wall, in some parts of considerable height, here and there furnished with indifferent-looking bastions, and provided with numerous gates. The greatest ornaments of the city are the temples, with their numerous spires; they cover a large extent of ground, and are placed in the most elevated and best situations, surrounded by brick walls or bamboo hedges; their inclosure contains numerous rows of buildings disposed in straight lines. The temples consist of one spacious and lofty hall, with numerous doors and windows. Both the exterior and interior are studded with a profusion of minute and singular ornaments of the most varied description. In the central temple, which has the form of a parallelogram, is a sitting figure of Buddha of gigantic proportions. An area incloses this central temple, and at a certain distance from it smaller temples are disposed in straight lines, filled likewise with gilded figures of Buddha, for the most part larger than life.

Bangkok is rather to be considered as a Chinese colony than as a Siamese town; for by far the greatest number of its inhabitants are Chinese and their descendants. This is partly to be attributed to its being a seaport situated on a large river in a low country, but still more to its origin, which is of modern date. When the ancient capital of the empire was taken by the Burmese in 1760, and the royal family was nearly destroyed, a merchant of the name of Pia-tac, either himself a Chinese or of Chinese extraction, put an end to the existing anarchy, and ascended the throne. He chose Bangkok for his residence, and favoured his countrymen, who settled there in great numbers; and though Pia-tac was afterwards killed, and a Siamese dynasty followed on the throne, the Chinese maintained themselves at this place. The population of Bangkok is estimated at from 350,000 to 400,000.

There are manufactures of tin, iron, and leather. The exports are sugar, black pepper, tin, cardamoms, fine wood, ivory, cotton, rice, hides, horns, skins, and feathers; their total value in 1884 was £1,250,000. The imports consist of tea, quicksilver, silks, porcelain, camphor, edible birds' nests, European and Indian piece-goods, opium, and glass-ware; their annual value is £1,000,000.

Bangkok is a place of considerable trade. The Menam is deep up to the town. There is a bar at the mouth of the river which has only 6 feet water upon it at low tides; and from February to September $13\frac{1}{2}$ feet; and the remainder of the year, that is, in the seasons of the south-western monsoons and of the rains, 14 feet at high tides. Consequently only vessels of from 300 to 350 tons ought to be sent to Bangkok. The most active commerce is carried on with the ports of the Chinese empire; but the trade between Singapore and other places of the neighbourhood has greatly increased of late years. The internal commerce with the extensive countries drained by the river Menam is also very important.

Many European firms carry on business in the city, and the English government maintains a consul there.

BANGOR, a city of Carnarvonshire, North Wales, is situated on Beaumaris Bay, at the base of a steep rock, in a narrow vale near the river Ogwen, not far from the northern entrance of the Menai Strait, and is 239 miles from London by the London and North-western Railway, and 9 miles N.E. of Carnarvon. It consists chiefly of a street about a mile long, stretching through a romantic valley, with several openings from the water side. The beauty of the surrounding scenery has long made it a favourite place of resort in summer, and it has been so much improved that it may almost be said to have been rebuilt. Bangor is a very ancient place. The bishopric, which was founded about the year 550, includes the whole of the island of Anglesey, nearly the whole of Carnarvonshire, and certain parishes in Denbighshire, Montgomeryshire, and Merionethshire. The revenue of the bishop is £4200. The present cathedral, an embattled cruciform structure, was commenced about the year 1496, and was completed in 1532. It is of small dimensions, with low massive tower crowned with pinnacles, and is situated in the centre of the town. It was restored and partially rebuilt under the direction of Sir G. Scott in 1874. There are some large places of worship for dissenters and a Roman Catholic chapel; also an infirmary and temperance hall. On the north side of the High Street spacious markets have been erected. The chief trade is in slates, which are obtained from the great quarries of Penrhyn, 6 miles distant, where 2000 men are employed. They are shipped to all parts of the world, and are also manufactured at Bangor into tables, chimney pieces, &c. Bangor is contributory to the Carnarvon district of boroughs. The population of the parish in 1881 was 11,370.

BANGOR, a village in Flintshire, North Wales, is beautifully situated on the banks of the Dee, in the outlying portion of the county which occupies a part of Shropshire. It was once the seat of one of the largest monasteries in Britain—the first, it is said, which was erected in the island. At one time this monastery contained 2400 monks. When St. AUGUSTINE could not bend the stubborn Welshmen to his mind, to become of one communion with Rome, as he wished, he is reported to have said: "If ye will not join me in preaching the way of life unto the heathen English, ye shall suffer death at their hands." Some years after this revengeful prediction, namely in 607, the heathen king of Northumbria, Æthelfrith by name, came to blows with the Welsh on the Dee; and seeing the monks of Bangor Isaac praying, he exclaimed, "If these men pray that we may be beaten, it is as if they fought against us." He therefore turned his arms first against the monks, and slew them, to the number of 1200, all that were in that land. Then men remembered the words of the angry archbishop. Population, 502.

BANGOR, a small seaport and market town of Ireland, in the county of Down, is situated on Bangor Bay, a small inlet from Belfast Lough. It is connected by railway with Belfast, 10 miles distant, and in summer a steamer plies between the two towns—Bangor being at

that season much frequented for sea-bathing. The town has much improved of late years, and now contains some good hotels and lodging-houses. It once had a large abbey, which was founded in the sixth century. The cotton manufacture is carried on to some extent in the town and neighbourhood, and a little business is done in the linen manufacture. Many of the females are also employed in flowered and embroidering muslin. There are places of worship for various denominations, several schools, and some charitable institutions. The population in 1881 was 3006.

BAN'GOR, a port in the United States, capital of the county of Penobscot, in the State of Maine, is 620 miles N.E. of Washington. Its situation is pleasant, and very advantageous in a commercial point of view, being on the W. bank of the Penobscot river, which is navigable to the town for vessels of 400 tons burden. It is 60 miles from the sea, but the tide rises 17 feet. The principal article of trade is lumber, which is sent down the river in large quantities. About 2000 vessels, each of above 100 tons burden, are employed, while the navigation is open, in the lumber trade, besides a large number of vessels in the coasting and foreign trade. The river is open about eight months in the year, when steamboats ply regularly between Bangor and Boston and Portland. The town contains saw and planing mills, shipyards and furniture manufactories. There are several fine public buildings. The population in 1880 was 16,856.

BANGSRING (Tupai) must be regarded as the type of a family of INSECTIVORA distinct from the hedgehogs, moles, and shrew-mice. They are found only in the Indian Archipelago. The body is long and narrow, the head elongated, the feet plantigrade and armed with strongly curved claws. The tail is long and bushy, and as the hairs are arranged on it in two rows it somewhat resembles a huge feather. The bangsrings feed on fruit as well as on insects. They are all arboreal in their habits, being scarcely surpassed in climbing even by the agile squirrel.

BANIAN'S. The word Banian is a corruption of the Sanskrit *banij* or *banik*, a merchant or trader, and is the term by which Hindus visiting foreign countries for mercantile purposes are generally designated. We find Hindia merchants noticed at an early period during the middle ages in several of the most distinguished trading towns of the East. Marco Polo mentions Hindus among the foreign traders who visited the fair of Tabriz; and in speaking of Aden he describes it as "an excellent port, frequented by ships arriving from India with spices and drugs." Indian merchants appear also to have settled, during the middle ages, on the eastern coast of Africa. Vasco de Gama, on his first voyage, met with several Indian trading vessels in the port of Melinde. In some of the principal towns of Persia and Arabia, the Banians appear to have sometimes formed a considerable class in society, and to have possessed much political influence. At the present day the name is given to those merchants of the West of India who are for the most part residents in the seaport towns of Bombay, Surat, Cambay, &c. who carry on an extensive trade with the interior of Asia by means of caravans. Their establishments are to be found in most of the commercial towns of Asia, and their trade extends as far as the borders of Russia and China, and into Africa as far south as Mozambique. They belong to a division of the caste Vaisya, wear a peculiar dress, abstain from eating flesh, and observe rigorous fasts. The nautical term *Baniam day* signifies a day in which no meat is served out to the crew, and is derived from the habits of the Banian traders.

BANIAS (Gr. *Paneas*), a town of Palestine, situated at the foot of a branch of Anti-Libanus, now called Jebel Heish, the Mount Hermon of Scripture, which was the northern boundary of the children of Israel, and

the *Panæum* of the Romans. Banias is supposed to be on or near the site of the Dan of the Jews. Its name was changed to *Cæsarea Philippi*, by Philip the Tetrarch, son of Herod. The modern village, which is 23 miles E. by N. of Tyre, contains only about 150 houses, mostly inhabited by Turks, but there are also Greeks, Druzes, and Arabs; it is a dependency on the town of Hāsbeya, and about 20 miles N. of it. It stands on a triangular-shaped piece of ground inclosed by the river of Banias and the Jordan, and backed by the mountains, at the foot of which, to the N.E. of the village, the river of Banias takes its rise in a spacious cavern beneath a precipitous rock. There are several ancient ruins near the village, among which are the remains of two castles built by the Arabs in the thirteenth century.

The Jordan takes its rise about 4 miles N.E. of Banias, near the foot of a hill called Tel-el-Kadi, where there are two springs, the larger of which forms at once a river from 12 to 15 yards broad, which rushes rapidly over a stony bed, and, passing south of Banias, forms a junction a little below that village with the river of Banias. This stream is still called Dhan; and it is said that the river of Banias was formerly called Djour, whence the name Jordan.

BANISHMENT, expulsion from any country or place by the judgment of some court or other competent authority. The term has its root in the word BAN.

As a punishment, banishment is unknown to the ancient unwritten law of England, although voluntary exile, in order to escape other punishment, was sometimes permitted. [See *ABJURATION*, *OATH* OF.] The crown has always exercised, in certain cases, the prerogative of restraining a subject from leaving the realm; but it is a legal maxim that no subject shall be sent out of it without his consent or by authority of Parliament. It is declared by the Great Charter, that "no freeman shall be exiled, unless by the judgment of his peers or the law of the land." There are, however, instances of an irregular exercise of the power of banishing an obnoxious subject by the authority of the crown; and in the case of parliamentary impeachment for a misdemeanour, perpetual exile has been made part of the sentence of the House of Lords, with the assent of the king. Aliens and Jews have often been banished by a royal proclamation.

Banishment is said to have been introduced as a punishment by a statute in the thirty-ninth year of the reign of Elizabeth, by which it was enacted that "such rogues as were dangerous to the inferior people should be banished the realm." At a much later period the punishment then called transportation was sanctioned by the legislature, and this is now superseded by penal servitude. Some towns of England used to inflict the punishment of banishment from the territory within their jurisdiction, for life and for definite periods. The extracts from the *Annals of Sandwich*, one of the Cinque Ports, which are printed in Boys' "History of Sandwich," contain many instances of this punishment in the fifteenth and sixteenth centuries.

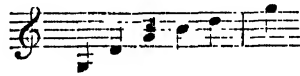
Deportation is the third of the six "peines afflictives et infamantes" of the French Code Pénal. The punishment of deportation consists in the offender being transported out of the continental territory of France, there to remain for life; and, if he returns, hard labour for life is added to his sentence. The sentence of deportation carries with it loss of all civil rights; though the government is empowered to mitigate this part of the penalty either wholly or in part (Law of September, 1835, s. 18, Code Pénal). Banishment (*bannissement*) is classed as one of the two "peines infamantes," the other being civil degradation. The offender is transported by order of the government out of the territory of the kingdom for at least five years, and not more than ten.

BANISTER. See *BALUSTRADE*.

BANJARMASSIN, a town on the south coast of the

island of Borneo, is built on the banks of the river Banjarmasin, at the mouth of which is a bar which prevents the entrance of anything except small boats. Beyond this bar the river is navigable for 50 miles from the sea. Vessels trading to the town anchor in the harbour of Tombanjon or Tomborneo, near the mouth of the river. Banjarmasin is included in the Dutch settlements. Many Chinese reside there constantly, and carry on a considerable trade with China. The imports are principally piece goods, opium, and gunpowder. The exports consist of small arms—the manufacture of which has been brought to great perfection—pepper, diamonds, gold dust, wax, camphor, spices, rattans, and edible birds' nests. Some steel of very superior quality is manufactured, and in the neighbourhood coal of good quality is profitably worked. Most of the houses of Banjarmasin are built on piles, and the town is subject to inundations. The population is about 30,000.

BANJO, a rough instrument of the guitar kind, supposed to be of African origin (the Senegambian *lamina*), very popular with the negroes of America, and made familiar to us by its use in the hands of "negro minstrels" whose blackness is but artificial. It has no guitar frets, and its long neck runs right through the body, serving not only to hold the pegs and act as finger-board, but also to stretch the wooden hoop or rim across which is strained the vellum drum-head that serves as a sound-board. There is no back to it. Banjos vary in number of strings, but the "concert-banjo" has usually five beside the "thumb-string," tuned thus—



The last note is the thumb-string or melody-string, played by the thumb, and therefore specially placed at the outside, next to the lowest bass string, its peg being inserted half-way up the neck instead of with the others. The length of the thumb-string is about 16 inches, and of the other strings 21 inches. While the thumb of the right hand plucks out the melody with force, the other fingers provide a simple tinkling accompaniment from the other strings, and the left hand "stops" the strings as required. The pitch is an octave lower than the music is written, following the rule of the guitar. The tone is poor and thin, but strikingly characteristic and exciting, and serves to accompany either singing or dancing.

The action of a finger-board is not so different from that of a

epoch of trade and conquest. It is probable also, we might add, that it penetrated across the continent from Egypt, where such instruments were in use in the time of Moses, as shown by a painted plaster slab now in the British Museum.

BANK—BANKER—BANKING. In its simplest form a bank is an institution where money may be deposited for safe keeping. Banks, however, usually lend, as well as receive money, and the profits of a banker are commonly derived from the excess of the interest he receives from those indebted to him over the interest he allows, as far as he allows any, to depositors. Goldsmiths and dealers in precious stones were formerly the chief money lenders, but in course of time banking became a distinct business of itself, and is even carried on in various independent branches. Bankers, for instance, in this country formerly borrowed money by issuing promissory notes payable to bearer, which passed from hand to hand as money, and banks thus borrowing were called banks of issue. Such powers of issue are now confined to the Bank of England, and to

banks which engaged in this branch of business prior to 1844. There are also banks of deposit, land mortgage banks, discount banks, credit companies, cheque banks, &c.

We have said that the ordinary business of a banker embraces the receiving and lending of money. He may receive either on a deposit or on a current or drawing account. Money received on deposit is commonly repayable to the depositor alone, to whom a deposit note or receipt is given; but it may also be paid to any one to whom the depositor gives an order on the bank endorsed on the receipt note. Should the banker undertake to pay interest on deposits, the rate varies according to the period the depositor guarantees to leave the money in the banker's hands before drawing upon it. When money is received on a current or drawing account, the banker's customer draws it out, as he requires, by means of orders, to which the technical name of "cheques" is given, books of cheque forms being furnished by the banker. Cheques may be made payable, 1st, to the person in whose favour they are drawn (the payee), or bearer; 2nd, to the payee or order, in which case endorsement by the payee is necessary before the money can be paid. A "crossed" cheque—that is, a cheque across the face of which are drawn two parallel lines—is legally payable by the banker on whom it is drawn through another banker. [See CHEQUE.] The lending operations of bankers are by their opening credits in their books, against which their favoured customers may draw to the extent of the credits opened—a system chiefly carried out in Scotland—by discounting bills, by the purchase of securities, or by advancing money on securities, &c.

Bankers and banking associations are the nucleus of keeping that portion of the floating capital of a country fully and constantly employed, which but for their agency would frequently lie dormant and unproductive. Thus, while banking does not directly create capital, the issue of bank-notes enables people to buy who otherwise could not buy for want of a medium of exchange. A large farmer, say, has grain and stock, and he wants to drain, but money is short. He goes to a bank and gets bank-notes on the security of his property. On the other hand, people may deposit small sums of money at a bank, which the banker lends to others; and a bank thus becomes the means of facilitating the loan of money from its possessors to any who may have goods but want ready money.

History of Banking.—The early history of banking is merely a record of the attempts which have been made from time to time to perform imperfectly some of the functions which are now so admirably executed by bankers. Money-lenders have existed in all ages; and the reference to usury in Exodus xxii. 25, shows that they were well known in the earliest times. The bankers of Athens appear to have been the first to fulfil most of the functions belonging to the trade. They received money on deposit at one rate of interest, and lent it out at another; they advanced money upon the security of goods, and lent sums in one place to be repaid in another. They likewise dealt in foreign coins, and appear to have occasionally advanced money to the state for public purposes. Some of them, as we are told, acquired great wealth.

Bankers (*argentarii*) conducted money business in Rome in a manner very similar to that now in use in Europe. They were the depositaries of the revenues of the wealthy, who through them made their payments by written orders. They also took in money on interest from some, and lent it at higher rates to others; but this banking trade does not appear to have been held in much repute in Rome, where a great prejudice existed against the practice of making a profit from the loan of money.

During the middle ages there was little opportunity for carrying on the banking business; but on the revival of commerce in the twelfth century, and when the cities of Italy engrossed nearly all the trade of Europe, the necessity

again arose for the employment of bankers. At first they carried on their business in the public market-places or exchanges, where their dealings were conducted on benches, whence the origin of the word bank, from *banco*, the Italian word for a bench. The successful manufacturing efforts of the Florentines brought them into commercial dealings with different countries of Europe, and thence arose the establishment of banks. In a short time Florence became the centre of the money transactions of every commercial country in Europe, and her merchants and bankers accumulated great wealth.

The earliest public bank established in modern Europe was that of Venice, which was founded in 1157.

About the year 1350 the cloth merchants of Barcelona, then a wealthy body, added the business of banking to their other commercial pursuits, being authorized so to do by an ordinance of the King of Aragon, which contained the important stipulation that they should be restricted from acting as bankers until they should have given sufficient security for the liquidation of their engagements.

The Bank of Genoa was planned and partially organized in 1345, but was not fully established and brought into action until 1407, when the numerous loans which the republic had contracted with its citizens were consolidated, and formed the nominal capital stock of the bank.

The Bank of Amsterdam was established in 1609 simply as a bank of deposit, to remedy the inconvenience arising from the great quantity of clipped and worn foreign coin which the extensive trade of the city brought there from all parts of Europe. The bank received foreign coin, and the worn coin of the country, at its real intrinsic value, deducting only a small percentage for the expense of coinage and charges of management. The Bank of Amsterdam professed to lend out no part of its deposits, and to possess coin or bullion to the full value of the credits given in its books. When the French invaded Holland, however, it was discovered that the directors had privately lent nearly £1,000,000 sterling to the states of Holland and Friesland, instead of keeping bullion in their cellars in accordance with the regulations of the bank. In 1814 a new bank was established, called the Bank of the Netherlands, on the plan of the Bank of England.

The Bank of Hamburg was established in 1619, and is conducted upon nearly the same plan as the Bank of England. The Bank of Vienna, established in 1703 as a bank of deposit and circulation, subsequently (1793) became a bank of issue, and its notes were for some time the sole circulating medium in Austria.

During the reign of the Empress Catherine three banks were established at St. Petersburg. Others have since been formed, some of which are for the benefit of the landed interest, and advance capital on property by mortgage.

The Bank of England.—This establishment was projected by a Scotch gentleman, Mr. William Paterson, in 1694. Government was at the time much distressed for want of money, and Mr. Paterson having proposed a loan of £1,200,000 for the public service, the sum was subscribed within ten days. The subscribers, besides receiving eight per cent. interest on the advance, and £4000 a year as the expense of management, in all £100,000 a year, were incorporated into a society denominated the Governor and Company of the Bank of England. The charter was granted in 1694 for eleven years, and entitled the society to hold property, receive deposits, issue notes, advance money on security; in fact, to transact all the usual business of bankers. The charter granted *exclusive* privileges, inasmuch as no other banking company or co-partnership was allowed within the kingdom. In 1708, the bank having made further advances to the government, its charter was renewed, though without quite so extensive a monopoly. The law of 1708 did not, like that of 1694, prohibit the formation of other associations for general banking business,

but it forbade the issue of notes by associations of more than six partners. The issue of notes, however, was regarded as so essential to the business of banking that it came to be understood and believed that joint-stock banking companies were absolutely prohibited in England, and accordingly no such associations were founded until the legislation of 1826 removed the doubt by expressly permitting them to be established. The law of 1826 allowed banks of issue to be established in any part of England distant at least 65 miles from London, and in the popular idea this radius of 65 miles around the metropolis formed a sort of charmed circle, within which no company or co-partnership might establish a bank of *any* kind. As a matter of fact, banks of deposit might have been formed in London, but as if from a nervous fear of encroaching on a powerful monopoly, none were formed. In order, therefore, to place this matter beyond doubt, another Act was passed, in 1833, confining the right to erect joint stock banks of issue outside the 65-mile circle, and definitely permitting

London. No joint-stock company, however, which had the privilege of issuing notes in England could establish itself in London, even to carry on a deposit business there. To come within the 65 mile circle involved the giving up of the privilege of issue. In 1864, for instance, when a London establishment was considered necessary for the National Provincial Bank of England, its note circulation was called in and cancelled in order to effect this object. The contest which arose in 1875 as to Scotch banks of issue establishing themselves in London turned upon the law of 1833 just referred to. That law did not actually forbid banks of issue having deposit branches in London, except when such banks of issue were *in England*. The London bankers, however, objected to the competition of corporations which they held to have largely profited by special and exceptional privileges of issue in other parts of the United Kingdom than England. These special privileges we will presently explain.

It will be seen that the very exclusive privileges granted to the Bank of England by its first charter only existed by law till 1708, or fourteen years; but as a matter of fact the bank enjoyed them till 1833, or nearly 140 years, for it was not till then that the public became alive to its misapprehension of the law, and that the first joint-stock bank was established *in London*. At this period (1833) the Bank of England had advanced to government the net sum of £11,015,100, and its charter was again renewed. Banks of issue had by this time become numerous, and were rapidly increasing. Bank-notes, bills, cheques, and other substitutes for money multiplied at far greater ratio than their solid representatives, and it became clear that if the issue of paper was much longer left to the unregulated discretion of an indefinite number of competing banks, a most fearful crisis would soon be brought about, indications of which were already apparent. Some idea of what the revulsion might have been is to be gained from the crisis of 1793, when, owing to a redundancy of paper money, a panic set in which occasioned the stoppage of 300 out of the 360 banks in England and Wales, and caused a melancholy extent of misery and bankruptcy.

In 1844, therefore, Sir Robert Peel introduced and carried through Parliament his celebrated Act, which was to obviate the chances of over-issue by limiting the power to issue notes payable on demand, and by making the amount of such notes in circulation vary with the amount of bullion in the possession of the issuers. The Act laid down that no new bank for the issue of notes should be established in any part of the United Kingdom, and that the maximum issue of notes by the existing country banks of England should in future be limited to the average amount which they had in circulation during the twelve weeks preceding the 27th April, 1844. The Act allowed

the Bank of England to issue notes to the amount of £14,000,000 *upon securities*, of which the £11,015,100 lent by the bank to the public service was the most important item. In the event of any of the then existing banks ceasing to issue notes, the Bank of England was empowered to issue, upon securities, two-thirds of the notes which such banks had been authorized to issue. Under this condition the total secured issue of the Bank of England in 1883 amounted to £15,750,000. For *every note* issued beyond this amount there must be an equal amount of coin or bullion paid into the coffers of the bank — by this means rendering the notes of the Bank of England really and truly equivalent to gold. These provisions with regard to the issue of notes have, however, been suspended by the government on three occasions—in October, 1847; in November, 1857; and in May, 1866—when the bank was authorized, under certain conditions as to the rate of discount to be simultaneously charged, to increase their issue of notes against securities; but the necessity for acting on the permission thus given did not actually arise except in 1857. It was therefore only on that occasion that the statutory limit of the issue was exceeded, and this temporary excessive issue subsequently received the sanction of Parliament. The Act also separated the banking from the issue department of the establishment, and exempted the notes of the bank from stamp duty, but, as an equivalent, deducted a considerable sum from the amount annually paid to the bank for its management of the national debt.

The *banking* department of the Bank of England does not essentially differ from other banks, except that no interest is allowed on deposits. But although its managers carry on their business without the slightest official connection with the government, the bank is really a great and very important engine of state. Under the authority of various Acts of Parliament the management of the national debt, both funded and unfunded, is intrusted to the bank. It conducts the issue and inscription of new loans, effects transfers and keeps accounts of all existing stocks, and pays the dividends thereon to the stockholders. It likewise prepares and issues, under instruction from the Treasury, exchequer bills, exchequer bonds, and treasury bills, paying the interest as it becomes due, and paying off or exchanging the bills or bonds at maturity. It also manages all the business of the various stocks and securities of the Indian government that is conducted in this country. The bank makes advances to the Treasury under the authority of the Exchequer and Audit Act (29 & 30 Vict. c. 39, s. 12), and of the Appropriation Acts of each session of Parliament. The provisions of the first-named Act are to the effect that at the end of each financial quarter the Treasury shall transmit to the controller and auditor-general an account of the income and charges of the consolidated fund in such quarter; and if it appears that the income for the quarter is not sufficient to defray the charge upon it, the controller and auditor-general shall certify the amount of the deficiency to the Bank of England, who shall be authorized to make advances from time to time during the succeeding quarter, on the application in writing of the Treasury, to an amount not exceeding in the aggregate the sum specified in such certificate; the amount of these advances to be placed to the credit of the exchequer at the bank, and the principal and interest to be paid out of the growing produce of the consolidated fund in the said succeeding quarter.

The provisions of the Appropriation Act are usually that the commissioners of her Majesty's Treasury may issue out of the consolidated fund a specified sum to make good the supply granted to her Majesty for the service of the year ending the 31st March following the date of the Act, and that the said commissioners may borrow from time to time, on the credit of the said sum, any sum or sums of equal or

less amount—the moneys so borrowed, with interest, not exceeding 5 per cent. per annum, to be repaid out of the growing produce of the consolidated fund at any period not later than the end of the next succeeding quarter to that in which the moneys were borrowed. Advances under the Exchequer and Audit Act—"deficiency advances"—are generally required at the end of each quarter to meet the heavy payments out of the exchequer for the dividends on the public funds and other charges due at these dates. "Ways and means advances," under the Appropriation Acts, are only resorted to when the deficiency of income is exceptionally large, and not likely to be made good in the quarter in which the advances are required. The bank acts as banker to the several great revenue departments, and receives both the sums paid to the receivers of revenue in London; and those remitted from various parts of the country. It likewise conducts the banking business of all the public departments. We have seen that the bank is entitled to issue the sum of £15,750,000 upon securities; but the greater part of these securities are funds lent to government, and as upon this loan the bank receives from the government about 3 per cent. interest, the public is clearly entitled to a share of the profits realized by the bank on the £15,750,000 of issue. An arrangement to this effect was made in 1861, to endure for twenty-five years. Under this agreement the bank receives, for its management of the national debt, £300 per £1,000,000 on £600,000,000, and £150 per £1,000,000 on the amount of debt above that sum. But on the other hand it pays to the government £60,000 per annum as commutation in lieu of stamp duty on its notes, and about £150,000 per annum out of the profits of issue.

There is such peculiar temptation to, and opportunity for, the commission of fraud in the course of stock transfers and dividend payments, that the responsibility and expense incurred by the bank in managing the public debt are very great. Its losses have at times been large. At an average of the ten years ending with 1831, the bank lost, through forgeries on the public funds, £40,204 a year.

From its first institution the Bank of England has discounted mercantile bills. The rate of discount charged fluctuated at first, but was usually between $4\frac{1}{2}$ and 6 per cent. In 1695 a distinction was made in this respect in favour of persons who used the bank for purposes of deposit. For such persons inland bills were discounted at $4\frac{1}{2}$, and foreign bills at 3 per cent.; while to all other persons the rate was 6 per cent. upon both descriptions of bills. After that time the rates were equalized to all classes, and fluctuated between 4 and 5 per cent. until 1773, when 5 per cent. was fixed as the rate of discount upon all descriptions of bills; and at this percentage the bank continued to discount bills until June, 1822, when it was lowered to 4 per cent. The rate was again advanced to 5 per cent. during the panic in December, 1825; but was lowered in July, 1827, to 4 per cent. In 1857 it fluctuated between $5\frac{1}{2}$ and 10 per cent.; and in the month of May, 1866, it again advanced to the latter rate. Generally, however, it is, as in the first years of the existence of the bank, between 3 and 6 per cent.

In the year 1759 the bank began to issue notes for £10, having previously not put any into circulation below £20. Notes of £5 value were first issued in 1793; and in March, 1797, £1 and £2 notes were brought into use. The issue of the latter, except in one partial instance, ceased, in fact, on the occasion of the resumption of cash payments in 1821, and by law on the 5th of April, 1829, since which time £5 is the smallest sum for which any bank in England may send forth its notes payable to bearer.

In 1817, having accumulated nearly £12,000,000 of coin and bullion, the bank gave notice in the month of April that all notes of £1 and £2 value dated prior to 1816 might be received in gold. In the September following,

a further notice was given that gold would be paid for notes of every description dated prior to 1817. The effect of these measures was to drain the bank of a large portion of its bullion, so that in August, 1819, no more than £3,595,960 remained in its coffers, and an Act was hurried through Parliament to restrain the bank from acting any further in conformity with the notices here mentioned.

Branch banks are established by the Bank of England at the west end of London, at the Royal Courts of Justice, and at Manchester, Birmingham, Liverpool, Bristol, Leeds, Newcastle, Hull, Plymouth, and Portsmouth.

The profits of the Bank of England are derived from interest on government stocks and securities—including the debt due by the government to the bank, stock in the public funds, exchequer bills and bonds, treasury bills, &c.; discounts on commercial bills; interest on loans and securities of various kinds; the allowance for managing the government and other stocks, &c.; profit on purchases of bullion; and some minor sources of income.

The bank maintains between 700 and 800 clerks, besides a large number of printers, porters, and messengers. Clerks are admissible between the ages of eighteen and twenty-five years. Every clerk on entering the bank is obliged to insure his life with an assurance society established within the bank, in connection with which are a savings bank and a guarantee fund, all maintained and managed exclusive by and for the officials of the establishment. Besides this the directors maintain a provident or benevolent fund, for the benefit of the widows of the *employés*. The clerks, &c., have also pensions to the extent of two-thirds of their salary when past work. A handsome library has been fitted up by the liberality of the directors, within the walls of the bank, for the benefit of the clerks, each of whom contributes 10s. annually, or a life subscription of £5, towards its funds.

In 1694 the stockholders divided 8 per cent., which was increased to 9 per cent. in the following year; from that time to 1729 the annual dividend fluctuated between $5\frac{1}{2}$ and 9 per cent.; for the next eighteen years the rate was $5\frac{1}{2}$ to 6 per cent.; in 1747 it fell to 5 per cent.; in 1753 to $4\frac{1}{2}$ per cent., which was the lowest rate of profit since its first establishment; from 1767 to 1806 the dividend was gradually increased to 7 per cent.; and from 1807 to 1822 the proprietors divided 10 per cent. annually; in 1823 the rate was lowered to 8 per cent., and so continued for some years; but from 1853 down to the present time it has fluctuated between 8 and 10 per cent., and £100 of the original stock has been accordingly worth from about £200 to £290. In addition to these payments the stockholders have at various times received bonuses to the amount of nearly £7,000,000.

For some years the directors of the bank acted as if under the impression that secrecy in regard to its condition was important to its prosperity, but the idea has long since been abandoned; and in compliance with 7 & 8 Vict. c. 32, they now furnish for publication in the *Gazette* a weekly statement of the notes issued, together with the amount of gold coin and bullion and securities held against such notes; also a separate account from the banking department of the capital stock, and the deposits, and of the money and securities belonging to the bank. We subjoin a copy of one of these accounts.

Dr.		ISSUE DEPARTMENT.		Cr.
Notes issued, . . .	£		£	
	37,427,610	Government Debt,	11,015,100	
		Other Securities, .	4,734,900	
		Gold Coin and Bullion,	21,677,610	
		Silver Bullion, . .	—	
	37,427,610			37,427,610

BANKING DEPARTMENT.

Cr.

Proprietors' Capital,	14,553,000	Government Securities,	13,474,213
Reserve,	3,124,753	Other Securities,	21,216,379
Public Deposits (including Exchequer, Savings Banks, Commissioners of National Debt, and Dividend Accounts),	5,611,196	Notes,	11,401,180
Other Deposits,	23,664,452	Gold and Silver Coin,	1,046,830
Seven-day and other Bills,			
			47,198,602

From this statement it will be seen that in the banking department the bank held as a reserve against the £29,520,849 of public and private deposits £12,508,010 in notes and coin as immediately available for payments or advances, or about 42·37 per cent. It is this reserve which in times of stress is anxiously studied, and the fluctuations of which serve to indicate the rates of discount. On 21st June, 1871, the reserve was £17,861,747, and the rate of discount was $2\frac{1}{2}$ per cent., while on 18th November, 1857, it was only £1,552,686, and the rate of discount was 10 per cent.

All persons may demand of the issue department notes in exchange for gold bullion at the rate of £3 17s. 9d. per ounce of standard gold; and the bank is compelled to purchase all gold at that price, regardless of the amount offered them, in return for which they are to give bank notes. For this gold they receive from the Mint coins at the rate of £3 17s. 10 $\frac{1}{2}$ d. per ounce. The small difference of 1 $\frac{1}{2}$ d. per ounce between the Mint and bank price for gold constitutes a charge on the owner of bullion which is perhaps not more than that which he would incur in preparing for coinage and the loss of interest on his treasure while detained at the Mint.

The mere titles of the Acts of Parliament more or less connected with the bank extend to nearly 200 pages. The story of the crises and dangers through which the bank has passed would occupy many more. In 1745 the advance of the young Pretender into England as far as Derby caused a heavy run upon the bank, and in order to gain time and devise measures for averting the run, the ingenious device was hit upon of paying in shillings and sixpences! The retreat of the Highlanders brought a more effectual relief. Rumours of an invasion in 1797 caused another panic, and the run upon the bank was so great that, had not the government come to the rescue, and issued an order in council on Sunday, 26th February, 1797, prohibiting the bank from paying its notes in cash, payment must have stopped on Monday, and this while the bank was possessed of property worth more than £15,500,000. The Bank Restriction Act was passed soon after, by which specie payment by the bank was suspended till six months after the signature of a definite treaty of peace. During the terrible riots in 1780 the bank was considered to be in imminent danger, and as a precaution against any similar emergency a military guard has since that time been nightly stationed on the premises.

From this account of the Bank of England it will be seen that its position in regard to the trading and financial interests of Great Britain is one of immense importance and great responsibility. Its influence extends far beyond the boundaries of the British Islands, or even those of the vast colonies and dependencies of the British empire. During the present century the metropolis of England has become the central point of the trade of the world, to which it occupies the position of international clearing-

house and bullion centre. In the latter respect it is to the cellars of the Bank of England that the supplies of the precious metals chiefly tend on reaching these shores, and from them that a great portion of the supplies are drawn to meet those final balances between nations which the transfer of bills, securities, &c., have been unable to settle. Exercising so great an influence it is not a matter for wonder that occasionally the action of the bank is called in question, or that at times criticisms are directed against its policy. It is noteworthy, however, in this age of colossal speculation and of gigantic financial operations, that it is never suggested by the most dissatisfied critic that the managers of the bank are actuated in their policy by any personal considerations. In the commercial world of England the conduct of the bank, like its stability, is "above suspicion."

Joint-stock and Private Banks in England and Wales.

—The Italian merchants who, under the name of Lombards, settled in England during the thirteenth century, and previously to that time the Jews, performed the greatest part of the money business of the country. They were not, however, bankers in the modern acceptation of the word; and, in fact, the business of banking does not appear to have been carried on among us earlier than the middle of the seventeenth century. The goldsmiths of London, who before that time had restricted their trade in money to the purchase and sale of foreign coin, then extended their business by borrowing and lending money. The latter part of their business—that of lending—was principally transacted with the king, to whom they made advances on the security of the taxes. They allowed interest to the individuals from whom they borrowed, and the receipts which they gave for deposits passed from hand to hand in the same manner as bank-notes have since circulated.

The taking of interest for the use of money was not rendered legal in England until 1516, when the rate that could be demanded was fixed at 10 per cent. The Lombard merchants were accustomed to demand 20 per cent. interest, and even more, according to the urgency of the borrower's wants. In 1624 the legal rate was reduced to 8 per cent., and a further reduction to 6 per cent. took place in 1651. At this rate it remained for a long period in Ireland, but was lowered in England to 5 per cent. in 1713. By the 17 & 18 Vict. c. 90, however, all usury laws were entirely repealed in this country.

The merchants of London had been used to deposit their money for security at the Mint in the Tower of London, whence they drew it out as occasion demanded; but in the year 1640 King Charles I. took possession of £200,000 thus lodged, which of course put a stop to that practice. This state of things preceded, and most probably led to, the extension of the business of the goldsmiths, as has just been explained.

This business soon became very considerable, and was found convenient to the government. In 1672 King Charles II., who then owed £1,328,526 to the bankers, borrowed at 8 per cent., shut up the exchequer, and for a time refused to pay either principal or interest, thus causing great distress among all classes of people. Yielding to the clamour raised against this dishonesty, the king at length consented to pay 6 per cent. interest, but the principal sum was not discharged.

The number of private banks in London about 1793 was fifty-six, of which only twenty-four are now in existence. The number is at present fifty-five. There are two private banking-houses still carrying on business which were established before the Bank of England. These are Child's, established in 1653; and Hoare's, in 1680. The London bankers continued to issue notes for some time after the closing of the exchequer, but they have long since ceased to do so, acting solely as depositaries of money, discounters

of bills, and agents for bankers which are established throughout the country.

There were very few country bankers established in England previous to the American War of Independence, but after the conclusion of that contest their numbers increased greatly. In 1793 they were subjected to heavy losses consequent upon the breaking out of the French war, and twenty-two of them became bankrupt. The passing of the Bank Restriction Act was the signal for the formation of many establishments for banking in the country. In 1809, the first year when bankers were required to take out a license, the number issued was 702, which gradually rose to 940 in 1814. In 1813–14 the number of licenses taken out by country bankers for issuing notes was 733, and the number of partners in these banks was 2234. In 1814 and the following years eighty-nine country bankers failed, and their numbers fell off greatly. In 1827 the number of private and joint-stock banks in England and Wales was 465 private and six joint-stock; in 1883 about 260 private and 120 joint-stock.

All country banks in England are banks of deposit and of discount. They act as agents for the remittance of money to and from London, and for effecting payments between different parts of the country. A large number of them are also banks of issue, and their notes in many cases are made payable at some banking-house in London, as well as at the place where they are issued. At the time of passing the law for the suppression of small notes in England provision was made for the establishment of joint-stock banks, which should be banks of issue, at any distance beyond 65 miles from London.

The country bank-notes in circulation in 1810 amounted to £23,893,868. In July, 1841, the issues of private banks were £4,624,179, and those of joint-stock banks £3,340,326, being together less than £8,000,000. In February of the same year there were forty-three provincial bankers which, by an arrangement with the Bank of England, agreed to issue the notes of that establishment exclusively, to the amount of £2,429,000. The number and amount have since been slightly increased. At present the fixed issue of the private banks in England is £1,265,142, and that of the joint-stock banks (exclusive of the Bank of England) is £3,274,358—making a total of £7,539,500.

By 3 & 4 Will. IV. c. 83, banks issuing promissory notes were required for the first time to make quarterly returns to the Stamp Office of the average amount of notes in circulation. The 7 & 8 Vict. c. 32, s. 18, requires returns to be made of the notes in circulation on every day in each week, the average for the week, and a like average or every four weeks. The Limited Liability and other recent Acts of Parliament have greatly facilitated the establishment of joint-stock banks, not being banks of issue, in all parts of the country.

Since the passing of the Limited Liability Companies Act of 1879 banks of unlimited liability have been able to register themselves as "limited" companies, shareholders therein then being liable only for the amount of the shares for which they have subscribed. The Act was passed in consequence of the terrible suffering involved by the failure of the City of Glasgow Bank in the preceding year. Banks of issue, however, are liable for the full amount of their note issues; and, moreover, if an unlimited company applies for registration as "limited," the nominal amount of its shares may be increased, so as to increase the capital which would be available in the event of the winding up of the bank.

Scotch System of Banking.—There are ten joint-stock banks in Scotland. Seven of these have their head offices in Edinburgh or Glasgow, are incorporated by Act of Parliament or royal charter, and enjoy equal privileges. Two have their head offices in Aberdeen, and one in Inverness.

None of the Scotch banks have exclusive privileges resembling the Bank of England and the Bank of Ireland.

The oldest of the Scotch Banks—the Bank of Scotland—was established by Act of the Scottish Parliament in 1695, with a capital of £1,200,000 Scots, or £100,000 sterling, divided into 1200 shares, and with the exclusive privilege of banking in Scotland for twenty years, from the 17th July, 1695. This privilege was not renewed. The capital of the Bank of Scotland has since been augmented at various times, and now amounts to £1,500,000 sterling, of which £1,000,000 has been paid up by the proprietors. This bank began to establish branches in 1696, and has now sixty-three. It commenced to issue £1 notes in 1704, and very early introduced the practice of receiving deposits on which interest was allowed. In 1729 it also introduced the system of granting credits on cash accounts, which has long formed a principal feature in Scotch banking, and has been of incalculable benefit in fostering the commerce and agriculture of the country.

The nature of these cash accounts consists in the bank giving credit by loan, to the extent agreed upon, to any individual or firm who can procure two or more persons of undoubted responsibility to become sureties by bond for the repayment when demanded of the sum credited, with interest. When this credit has been obtained the holder may employ the amount in his business, drawing out and paying in at his convenience, but paying interest only upon the sum which he actually owes to the bank at the close of business each day. When the banks were allowed to issue an unlimited quantity of notes without holding specie against them, these credits were of much use in increasing and maintaining the circulation of their notes; but since the passing of the 8 & 9 Vict. c. 38, in 1845, which regulates the issue of bank-notes in Scotland, the augmentation of the circulation has become a loss instead of a profit to them, and they only continue to grant cash credits with the view of encouraging the trade of the country.

By the Act above referred to (8 & 9 Vict. c. 38), the power of issuing notes in Scotland is confined to those banks that issued notes in the year preceding 1st May, 1845. And each bank is required by it to hold gold or silver coin at its head office or principal place of issue equal in value to any excess of issue beyond the average amount of notes it had in circulation during the year ending 1st May, 1845: the proportion of silver not to be greater than one-fourth of the amount of gold. Each bank is required to make weekly returns to the Stamp Office of its notes in circulation, and of the gold and silver coin on hand, and the averages of every four weeks are published in the *London Gazette*.

By this Act the Scotch banks were obliged to keep a much larger amount of gold in stock than before. The Act, however, has not been able to create in the minds of the Scotch people a fondness for gold. Hence, when the amount of the circulation gets beyond the legal standard, gold is sent from London, and quietly locked up in the cellars of the banks, and when no longer required is returned to London. Of course this process is a loss to the banks of issue, but still it is in this way a much smaller one than it would be if the gold were circulated, and a corresponding amount of notes withdrawn.

In 1793 and 1825, when so many bankruptcies took place among country bankers in England, not one Scotch bank failed to make good its engagements. The Lords' Committee on Scotch Banks, in 1826, reported that "the banks of Scotland, whether chartered or joint-stock companies, or private establishments, have for more than a century exhibited a stability which the committee believe to be unexampled in the history of banking." The private fortune and landed property of every partner in a Scotch bank is liable for its debts; and the soundness of this system was most triumphantly established in the failures

of the Western Bank of Scotland and the City of Glasgow Bank, in 1857 and 1878 respectively, with liabilities amounting together to no less than £20,000,000—all of which were paid in full.

The forty years which succeeded 1841—a period marking an important epoch in Scotch as well as English banking—witnessed a marvellous change in the trade and commerce of Scotland. Her population and wealth, her industries and commercial relations, enormously expanded. The banking resources of the country correspondingly increased; in fact, the expansion of material prosperity to which we have alluded may be traced in no small measure to the enterprise of Scotch bankers, in having covered the country with their branches, so that the familiar bank was not far removed from any one. And while, on the one hand, the utmost inducement was held out to thrift and saving by the acceptance of very small deposits at interest, the system of cash credits has been of great use to many a now thriving farmer and manufacturer during his first struggle in commencing business.

The deposits of Scotch banks were estimated at £20,000,000 in 1826, when the banks were the sole depositories of the savings of the country. In 1844 the amount was supposed to have increased to £30,000,000. In 1883 the amount was ascertained to be about £80,000,000, while in the meantime innumerable channels for the investment of surplus capital had been formed, all unknown in 1844. Indian and foreign banks without number competed successfully in Scotland for deposits, which they employed abroad on terms enabling them to offer rates of interest which could not be earned at home. The government entered the field through the Post Office Savings Banks, and building and investment societies, railway and other companies, were all formidable competitors with the banks for the surplus capital of the country. The increase of the deposits of the Scotch banks from £30,000,000 to £80,000,000, therefore, by no means marked the whole progress or savings of the country. In 1844 there were twenty banks with 376 branch offices. Now the banks have been reduced to ten by amalgamation, the smaller concerns being pressed out of existence under a system where the competition is so strong, and the rate of banking profit so small, as to make it possible only for banks with large resources and of a national character to subsist. But notwithstanding this decrease in the parent establishments, the branch offices have increased to nearly 900.

During the same period Scotch commerce became more cosmopolitan. In 1844 few mercantile firms in Scotland had an account with a London banker, and if they gave an acceptance payable in London it was a rare exception. Nowadays the exception is for a firm engaged largely in foreign trade to accept a bill payable in Scotland. Their bills are, as a rule, domiciled in London. Their remittances from abroad are all in the shape of bills on London. Moreover, London is the place where the reserves of Scotch banks are necessarily kept, and where their surplus funds can alone be invested. Their resources are considerably in excess of the requirements of Scotland, and London is the proper, indeed the only, outlet for this excess. The investment and management of these reserves and surplus funds is obviously a very responsible part of the duty of a banker, on which depends the solidity and safety of his concern; and the advantage of performing it through a responsible representative in London is apparent. Equally important to the Scotch banker is the ability to offer to his Scotch customers the facilities in the conduct of their business which a bank account in London affords. Mercantile men are not slow to discover such advantages, and it was in self-defence, and for the conservation of their Scottish business, that some of the banks were driven to establish themselves in London. Urged on by the require-

ments of the commercial community, the National Bank of Scotland started an office in London in 1864; the Bank of Scotland did the same in 1867; and the Royal Bank in 1874. The Clydesdale Bank also opened branches in Cumberland in 1874, and the hostility of the English bankers to this step was manifested in 1875 by a bill being brought into Parliament to confine Scotch banks to Scotland. The English bankers urged that Scotch banks had in Scotland rights of issue which were denied to many English banks altogether, and which were enjoyed by others only in a much more restricted form. It was the enjoyment of these special advantages, denied to English banks, which had enabled Scotch banks to accumulate vast resources, with which they could compete unfavourably with the bankers of the sister country. English banks of issue, moreover, were excluded from their own metropolis; and it was hard that Scotch banks should be permitted to do that which was denied to English banks. The easy as well as conclusive answer would seem to be that English joint-stock banks of issue should be freed from their disabilities, rather than Scotch banks should be excluded from a position which commercial extension had rendered a necessity. Scotch banks, again, could scarcely be excluded from London in fairness while Irish and foreign banks were allowed to remain.

Bankers in Ireland.—A national bank was established by charter in Ireland in 1783, with the same privileges as those granted to the Bank of England by the Act of 1708. The original capital of this corporation was £600,000, and was lent to government at 4 per cent. interest. The management is vested in a governor, deputy-governor, and fifteen directors. In 1809 the capital was increased by £1,000,000. This sum, which was raised by subscription among the proprietors at the rate of 125 per cent., was also lent to government at 5 per cent. interest. A further prolongation of the charter was granted in 1808, and in 1821 the capital was augmented to £3,000,000—of which £2,630,000 is lent to the government.

The system adopted by and in regard to the Bank of England has on various occasions been extended to the Bank of Ireland. In 1797, when it became necessary to restrict the Bank of England from paying its notes in gold, that measure was, almost necessarily, adopted in Ireland, and in consequence the issue of the Bank of Ireland notes increased from £780,000, which it was in 1797, to upwards of £4,000,000, before the Suspension Act was ultimately repealed.

Bills are discounted by the board of directors in Dublin and by the agents at the branches, of which there are now between forty and fifty spread over the country. There is no prohibition whatever upon the bank applying its own resources to proper business purposes. It receives money on deposit, on which interest is allowed at rates fixed by the board, and which vary with those charged for the discount of bills. They buy, sell, and transfer public funds for persons in any part of Ireland, on the same terms as if those parties were personally present in Dublin, and employed a broker to do it. When the dividends become payable in Dublin they pay them to the proprietors of stock in the most distant parts of Ireland by means of their several branches, without expense to the government.

The authorized fixed circulation of the Bank of Ireland is £3,728,428; its capital, £3,000,000; and its reserve fund, £1,057,500. In addition to the Bank of Ireland there are five private banks in Dublin, and eight joint-stock banks, with branches in various parts of the country.

An Irish bank has to contend against many disadvantages, and there are various legal restrictions in connection with banking in that country, which are not in force in any other part of the United Kingdom, such restrictions having had their origin from the numerous failures which took place there about half a century ago. For instance,

a banker may assign to his brother, but not to his son, even for a valuable consideration, although the creditor, who claims that the assignment shall be void, was not a creditor at the time it was made. So that by this law a person, while he continues a banker, cannot make a marriage settlement on son or daughter, so as to be good against a creditor. It is also illegal in Ireland to give any receipt for the deposit of cash in the bank bearing interest. Some joint-stock banks, to avoid the penalties of such a law, give receipts for deposits, and put the conditions for the payment of the interest on the back of the receipt, that mode not coming within the meaning of the words "therein contained." There is another provision affecting Irish bankers, which is considered oppressive, viz. that if a banker fails and cannot pay the principal of his obligations, he must pay legal interest for them.

The deeds of partnership of some of the banks of Ireland contain clauses absolutely prohibiting the shareholders from interfering in any manner whatever with the business transactions of the bank. It is a system of entire confidence on the part of the shareholders in the directors, whose appointments are permanent.

Bank of England notes are not a legal tender in Ireland, nor in fact are any notes. Those banks who claim to issue notes must give notice to the Commissioners of Stamps, &c., who fix the amount each bank is to issue. The joint-stock banks of Ireland do not publish any periodical reports of their condition. They call their proprietors together, and submit a short statement to the meeting, which sometimes appears in the local newspapers, and that is the only means the public have of knowing anything at all about them.

Foreign Bankers.—The Bank of France, established in 1803, has a capital of £7,320,000 sterling. This association alone enjoys the privilege of issuing notes in France, and as a consequence the circulation is comparatively limited. Before the war with Germany in 1870-71, the bank had, however, only very distant relations with the state. It had certainly lent it 100,000,000 francs in 1859, which resulted from the doubling of its capital, and it intervened to facilitate certain operations of the treasury. But it retained above all its commercial character. It was commerce which nourished the greater part of its operations. For some time after the war, however, the position was reversed, and its relations with the state, which was then its best customer, became so intimate that at one time it had lent it five times the amount of its capital. The affairs of this bank are managed by a governor and deputy-governor, who are nominated by the government, and by seventeen regents and three censors elected from among the shareholders. A return is issued weekly, which furnishes a complete exposition of the affairs of the bank. The concern is second in magnitude and importance to the Bank of England only, and, like the latter institution, has passed through several memorable crises. It was only saved from pillage by the Communists in 1871 by the remarkable adroitness of its staff; and that the management of the bank through many years of difficulty has been eminently prudent and successful may be gathered from the fact that the 1000-franc share of bank stock was worth nearly 4000 francs in 1883.

The bank of Germany was established in 1875 by a law which came into operation in 1876. Like almost all German law-making of late years, its object was to promote the unity of the empire by the promotion of an Imperial Bank, which in course of time may absorb the various local state banks. The latter, thirty-two in number, were recognized as possessing rights of uncovered issue to the extent of £6,750,000, and cannot exceed this except by payment of 5 per cent. on the excess. The Imperial Bank has an uncovered issue of £12,500,000, all excess upon which must be secured by one-third cash in hand and

two-thirds of bills having not more than three months to run. The bank is the property of private shareholders, with a capital of £6,000,000. But though the company is private, it is enacted, as the price of special privileges conferred by the state, that the bank shall be under the entire control and management of the Imperial chancery, and the profits are divided between the shareholders and the Imperial treasury. The various state banks are also liable to many interferences and restrictions upon free banking, more especially in their note-issuing operations. The Imperial Bank, or more strictly speaking, the state itself, under a law of 1874, may issue about £6,000,000 in notes of small denominations, but no other bank can issue paper of less value than £5.

Interest.—At various times banking establishments in London have adopted the principle of allowing interest upon deposits placed in their hands. The practice of most of the joint-stock banks is to allow a moderate interest, depending on the market value of money, for any sum exceeding £100, provided that it is not withdrawn by the depositor in less than one month. Some of these banks receive deposits as low as £10, and others allow a higher rate of interest on large than on small sums. It is expressly stipulated by bankers in these cases that the rate of interest on the sum deposited will be liable to fluctuation according to the state of the money market. It was formerly the practice to allow 1 per cent. less than the Bank of England rate, but the joint-stock banks now limit their maximum rate to 5 per cent.

The profits of London bankers are principally derived from discounting mercantile bills, either for their customers or, through the intervention of brokers, for other parties; and from loans on marketable securities, which are granted either at a fixed rate of interest for a short period, or at a fluctuating rate determined by that of the Bank of England. In the latter description of business the bankers usually require a margin of from 10 to 15 per cent. in the security to be *maintained* by the customer; and as they have power of immediate sale if this is not complied with, such loans form a very safe means of employing their capital.

Several very large failures which occurred in 1875, and the sweeping losses sustained by certain banks and discount houses, caused special attention to be directed to the question of the allowance by bankers of interest on the very large sums deposited with them. It must be admitted that the essence of sound banking is to collect and take care of so much of the floating capital of the country as is required for the current expenditure of private persons, and the current requirements of merchants and traders. The whole of the money so collected should be held by the banker in forms available on the instant or at very short notice, and his profit should be limited to the interest he can make by employing so much of the balances in his hands as his own experience has shown that he may safely convert into short bills and advances. All experience bears uniform and infallible testimony to the fact that dangerous banking begins at the moment when these principles are disregarded. Hence it is that the allowance of interest on deposits by bankers has been held by many to be itself a step in the wrong direction. Some of the most solid and famous banks have never done it; as, for instance, the Bank of Hamburg, the Bank of France, and the Bank of England; and the private bankers of London never allow interest on current accounts, never invite deposits at interest from the general public, and only under special conditions from their own customers.

The consequences either positively dangerous or tending towards danger which are likely to arise from the allowance of interest by banks, or from the allowance of rates of interest so high as to leave but small and uncertain margins of profit to the banks, are:—(1) The conversion of the banks to a large extent into investment institutions

—that is to say, the public put into the banks large sums for which the respective owners should themselves find permanent employment in securities or enterprises of their own choice. (2) The obligation of paying interest on these large sums compels the banks to entertain applications for advances from persons and for purposes more or less outside the sphere of prudent banking practice. They have millions of deposit to employ, and they can only employ them by doing business in the mass, by huge loans on the Stock Exchange, by a vast granting of acceptances to foreign correspondents, by large commitments to enterprises of a distant and future character. There are men who manufacture worthless bills, promote dazzling companies, live in grand houses, talk largely about finance, fail for fabulous amounts, and pay microscopic dividends; and many of this class are to a large extent the creation of the plethora of deposits and the necessity of making a profit on them. If Overend, Gurney, & Co., or the City of Glasgow Bank, had not been overburdened with millions of money, few of the finance schemes which brought them to ruin would ever have seen the light; and the wonder is not that a crash occurs now and again, but that such disastrous failures are not more frequent.

Cheque Bank.—The most ingenious development of banking of late years is that known as the *Cheque Bank*. When money is deposited, the only receipt given is a cheque-book containing cheques for the amount lodged. The depositor can only draw to the amount of his deposit and no further, for in the corner of each cheque its value is perforated in words, thus being indelibly fixed. The cheque may be written for less than the amount stamped, but not for more; and no cheque can ever be returned with "No funds" inscribed upon it, for the possession of the cheque-book is absolute guarantee that cash to the sum perforated stands to the credit of its holder. The advantages of such a bank are a great boon to British commercial interests, owing to the scarcity of gold; and it also offers great encouragement to small accounts. No interest is paid by the Cheque Bank, and to the artisan or retail dealer constantly making small payments, and to whom the interest on their deposits is of little moment, the Cheque Bank holds out great inducements, for by holding one of its cheque-books much trouble is saved. It is superior to the Scotch small notes, inasmuch as the cheques are good in any part of the kingdom, and may be for any sum according to will. The cheques have, in fact, every advantage which could accrue from a system of Bank of England notes of very small denomination. They may be written for the amount perforated, or any sum within it; and being the *only* instrument with which that particular sum can ever be drawn out, are free from all the risks attendant upon ordinary cheques. The Cheque Bank acts in co-operation with already existing banks, about a thousand of which, including branches, receive its cheques in various parts of the United Kingdom, in addition to 600 banks in foreign parts.

Bankers' Clearing House.—Of late years English bankers have taken advantage of what is termed the "Clearing House," in Lombard Street, where bills of exchange, cheques, &c., drawn on the different banks are transferred from one to another with wonderful celerity. To show the extent to which the system has been adopted, it is only necessary to state that the amounts settled at the clearing house are now above £6,000,000,000 per annum—all of which is effected without the use of a single bank-note or sovereign.

The operations of the clearing house, although really simple, evidence considerable ingenuity; and the arrangements by which enormous monetary transactions are concluded with facility and correctness can only be carried out by the exercise of great care. A clerk from each banking establishment attends at the clearing house at

certain hours, and delivers to the representatives of other banks the cheques or bills payable, and which are charged by him against the several banks to which they are delivered; in like manner the respective banks are credited for such cheques, &c., as he may have received from their representatives. These cheques, &c., are then taken to the banking house for examination and payment, and any of them that cannot be paid are charged against the bank from which they were received. At the close of the clearing, a balance is struck between the receipts and payments, and its amount transferred through the medium of an account kept for that purpose at the Bank of England—each bank keeping an account, and generally a considerable reserve balance with that institution. By this process not only is the risk avoided of robbery and loss that might arise, through the conveyance of large sums in bank-notes to settle the balances arising between the several banks, but a great economy is effected in the bank-note circulation—to the extent probably of not less than from £600,000 to £800,000. The same system has also been adopted for the clearing of all cheques on country banks through the medium of their respective representatives in London.

We subjoin statistics showing the working of the Bankers' Clearing House for the year ending 30th April, 1884, and for the seventeen years during which they have been published:—

	Total for the Year Ended 30th April.	Month.	On Stock Exchange Account Days.	Settling Days.
	£	£	£	£
1867-68	3,257,411,000	147,113,000	414,443,000	132,203,000
1868-69	3,534,039,000	161,861,000	550,622,000	142,270,000
1869-70	3,720,623,000	168,523,000	594,763,000	148,822,000
1870-71	4,018,464,000	186,617,000	635,946,000	169,141,000
1871-72	5,259,722,000	229,020,000	942,446,000	233,813,000
1872-73	6,003,336,000	266,065,000	1,032,474,000	243,561,000
1873-74	6,909,586,000	272,441,000	970,045,000	260,072,000
1874-75	6,013,209,000	255,950,000	1,078,585,000	260,338,000
1875-76	5,407,243,000	240,807,000	962,505,000	242,245,000
1876-77	4,573,000,000	231,630,000	719,703,000	223,756,000
1877-78	4,866,533,000	240,190,000	745,865,000	233,385,000
1878-79	4,985,091,000	212,241,000	811,072,000	221,264,000
1879-80	5,265,976,000	218,477,000	865,553,000	233,143,000
1880-81	5,909,989,000	240,422,000	1,205,197,000	261,579,000
1881-82	6,382,664,000	256,664,000	1,379,194,000	269,788,000
1882-83	6,189,140,000	242,641,000	1,169,315,000	253,545,000
1883-84	5,838,158,000	238,915,000	1,005,062,000	257,171,000

BANK FOR SAVINGS. See SAVINGS BANKS.

BANK HOLIDAYS. In 1871 an Act (the 34 & 35 Vict. c. 17) was passed, providing that Easter Monday, Whit Monday, the first Monday in August, and the day after Christmas Day (if it be a week day) shall be bank holidays, and that bills due on such days shall be payable on the following day. The sovereign is empowered to appoint, by proclamation, any day as a bank holiday, or to alter, by order in council, the days fixed by the Act, and appoint other days in their place.

BANK-NOTES, MANUFACTURE OF. The chief object in the manufacture of bank notes is to render forgery difficult and easy of detection. Various methods, such as peculiarity in the paper and ink used, in the watermark, and the intricacy of the design, have been adopted, and sometimes a combination of them all. In the Bank of England the notes are printed upon a peculiar paper, which is made only by one firm, and only for this purpose. Being made of new linen cuttings of rags, it is remarkable for its strength, lightness, and for a peculiar crispness to the touch, which renders it exceedingly difficult to imitate. The watermark in the paper is made very prominent, and this has always formed one of the chief difficulties in the way of the forger. A common test of the genuineness of a note consists of wetting the watermark with the tongue and holding the note up to the light, when, if the note be genuine, it will appear more clearly, but if otherwise, it will

appear blurred, or disappear altogether. The notes are printed with an open design from electrotype blocks, the machine registering every impression. They are only allowed to go into circulation once, being destroyed by the bank when returned for payment.

BANKRUPT (Fr. *banqueroutier*, a bankrupt, and *banqueroute*, bankruptcy; from Lat. *banco*, the bench or counter of a tradesman, and *raptus*, broken) is a trader whose property and effects, on his becoming insolvent, are distributed among his creditors under the bankrupt laws. These laws, which originated in England with the statute 34 & 35 Henry VIII. c. 4, were first mainly directed against the frauds of traders, who acquired the merchandise and goods of others, and then fled to foreign countries, or lived in extravagance and eluded and defrauded their creditors. The present bankruptcy laws have in view two main, and at the same time distinct, objects. These objects are, first, the honest administration of bankrupt estates, with a view to the fair and speedy distribution of assets among the creditors whose property they are; and, secondly, following the idea that prevention is better than cure, to do something to improve the general tone of commercial morality, to promote honest trading, and to lessen the number of failures—in other words, to protect the salvage and diminish the number of wrecks.

Up to 1831 creditors had the entire administration of bankrupt estates, a system which resulted in great confusion and dissatisfaction. In 1831 Lord Brougham's Act was passed, one of the leading features being the introduction of a class of official assignees, to whom was committed, practically, the control over the administration of bankrupt estates. For nearly thirty years this system appeared to receive universal approval, but in 1861 public opinion seemed to be turning against official assignees, and an Act was passed considerably limiting their duties. In 1864 a parliamentary committee reported entirely against the system, and advised the abolition of official assignees; in 1869, accordingly, they were totally abolished, and a new Act revived once more that system of voluntarism which had so signally failed prior to 1831. Why the official system lost popular favour it is not easy to see, inasmuch as it was the only one that gave any satisfaction at all. The chaotic state into which bankruptcy business fell after 1869 was as complete and as disastrous as that which prevailed before 1831. From the various chambers of commerce and all the leading centres and associations of trade there arose a chorus of complaint; and in response to the universal demand a new Bankruptcy Act was passed in 1883, the chief portions of which took effect from 1st January, 1884.

From the latter date all other Bankruptcy Acts are repealed, and by the new one an entirely fresh departure in bankruptcy legislation is made, the leading feature of which is a severance between judicial and administrative functions. Judicial functions, of course, are left to the courts, but administrative supervision and control are intrusted to an executive department of the state, namely, the Board of Trade. Creditors still retain the general control over the estate of the bankrupt, but his conduct is made the subject of an independent judicial investigation, with a view to his punishment if his insolvency has been the result of culpable recklessness or fraud. According to the theory of former Acts, the debtor and his creditors were the only parties concerned in a bankruptcy. The present measure recognizes and gives effect to the principle, that bankruptcy is a matter which, indirectly if not directly, affects the community at large. The Act accordingly provides that in all proceedings under it, whether they terminate in bankruptcy proper or in a composition or scheme of arrangement, the debtor shall have his affairs investigated and reported upon by an officer of the Board of Trade (the official receiver), and shall undergo a public

judicial examination. Through this ordeal every insolvent debtor must pass; and whether he will be allowed to enter into a composition or to obtain a discharge will depend on the result of this investigation into his previous conduct.

Another most important feature of the new Act is the provision made for unclaimed funds and dividends. Estates formerly went into liquidation, and very often nothing more was heard of them, the entire funds, when questions were asked, being stated to be insufficient for costs, but no accounts were rendered to creditors. In other cases dividends were declared, but declared in such a way that creditors who had money to receive were not likely to hear of the declaration, or, if they heard, would find it most inconvenient to go to the place appointed to receive the money. In addition, there always arose in a prolonged liquidation an accumulation of unclaimed money which belongs to creditors who have either died or left the country, or where the single amounts are too small to be much worth claiming, though the aggregate may be valuable to the trustees from whom they were not claimed, and in whose hands they remained. The unclaimed funds and dividends were thus a source of illegitimate profit to the class of trustees, and the desire to possess them was one of the potent causes of the ardent competition for appointments in bankruptcies and liquidations, which would have been unintelligible if trustees and solicitors had received only a fair reward for professional services. Hence, in great part, arose the subsequent neglect and mismanagement, and the utter indifference frequently shown to the interests of creditors. Accountants and lawyers not only ate up as much as they could by direct charges, but they had the advantage of an unacknowledged reversion of the estate, which was increased by every artifice employed to prolong the liquidation and to delay the declaration of dividends. The final result was that, according to the calculations of the controllers in bankruptcy, there was in 1883 about £4,000,000 of "nobody's money" in the hands of the class of trustees who had up to that time preyed upon bankrupt estates.

The law of 1869 never intended unclaimed funds and dividends thus to remain in the hands of trustees. On the contrary, provision was made for their being vested in the crown; but the means for insuring this were so loose, and the latitude allowed to trustees so extensive, that the provision was practically valueless. The new Act revived the official system, but in a different and much more efficient form. Every case of bankruptcy and every trustee is now under the supervision of an officer of the Board of Trade. To that Board trustees must submit their accounts for audit; and very stringent regulations are laid down to insure that all unclaimed funds and dividends shall be paid over to the bankruptcy estates account at the Bank of England.

Under the Act of 1883 a debtor commits an act of bankruptcy (1) by assigning away his property; (2) by absconding himself with a view to defeat or delay his creditors; (3) if he lets execution against him proceed to a sale of his goods; (4) by failure to pay a judgment debt; (5) if he give notice to any of his creditors that he has suspended payment of his debts; (6) if he present a petition to the court stating that he is unable to pay his debts. A creditor or creditors to the amount of £50 may petition for adjudication against a debtor.

On the presentation of a petition, either by debtor or creditor, the court may make a receiving order, by which an officer of the Board of Trade, known as the official receiver, is constituted receiver of the property of the debtor.

The duties of an official receiver have relation both to the conduct of the debtor and to the administration of his estate, and are generally (1) to protect the interests of the general public by inquiring into, exposing, and providing

for the punishment of fraudulent and reckless trading or culpable extravagance; (2) to protect the interests of the creditors at an early stage of the proceedings by obtaining and giving them the information without which they are helpless, and which experience has shown they are unable to obtain for themselves; (3) to act as receiver of the bankrupt's estate pending the appointment of trustee, and during any vacancy of that office, and also as manager where no special manager is appointed. The remuneration of the manager, where one is appointed, and of the trustee, is fixed by the creditors, and payable out of the estate; but official receivers and other persons appointed by the Board of Trade are paid out of public money, and the exchequer is recouped by means of fees and percentages.

Every debtor against whom a receiving order is made must submit to the official receiver a statement of his affairs, a summary of which such official is to transmit to each creditor. A meeting of creditors will be summoned by the official receiver within fourteen days, at such place as he shall think fit, and be attended by the debtor. At their first meeting the creditors may resolve that the debtor be adjudicated bankrupt, or pass no resolution, and thereupon he will be adjudicated bankrupt, and his property will vest in a trustee appointed by the creditors, unless the assets of the estate are under £300, when the court will make an order that the estate be administered in a summary manner, without any committee of inspection, and the official receiver will act as trustee. Arrangement is made for insolvency to a still smaller extent than this, by a provision that where a judgment is obtained in a county court against a debtor who is unable to pay the amount forthwith, and alleges his whole indebtedness amounts to a sum not exceeding £50, the county court is to make an order for the administration of his estate and for the payment of his debts by instalments or otherwise, and carry such order into effect in manner prescribed by general rules.

The property of the bankrupt divisible among his creditors does not comprise the following:—1. Property held by the bankrupt on trust for any other person. 2. The tools (if any) of his trade, and the necessary wearing apparel and bedding of himself, his wife, and children, to a value, inclusive of tools and apparel and bedding, not exceeding £20 in the whole. But it comprises the following:—1. All such property as may belong to or be vested in the bankrupt at the commencement of the bankruptcy, or may be acquired by or devolve upon him before discharge. 2. All goods being, at the commencement of the bankruptcy, in the possession, order, or disposition of the bankrupt, in his trade or business.

The bankrupt must, to the utmost of his power, aid in the realization of his property and the distribution of the proceeds among his creditors. He must attend for examination the first meeting of creditors, and also be publicly examined on a day to be named by the court, when his conduct and dealings will be inquired into. He must give such inventory of his property, such list of his creditors and debtors, and of the debts due to and from them respectively, submit to such examination in respect of his property or his creditors, attend such meetings of his creditors, wait at such other times on the official receiver, manager, or trustee, execute such powers of attorney, conveyances, deeds, and instruments, and generally do all such acts and things in relation to his property and the distribution of the proceeds among his creditors, as may be reasonably required. If the bankrupt wilfully fail to perform the duties thus imposed on him, he is, in addition to any other punishment to which he may be subject, guilty of a contempt of court, and may be punished accordingly. The trustee, with the consent of the committee of inspection, may from time to time, during the continuance of the bankruptcy, make an allowance to the bankrupt out of

his property for the support of himself and family, or in consideration of his services if he is engaged in assisting to wind up his estate.

The following debts are paid in priority to all others. Between themselves such debts rank equally, and are paid in full, unless the property of the bankrupt is insufficient to meet them, in which case they abate in equal proportions between themselves. All parochial or other local rates due at the date of the order of adjudication, and having become due and payable within twelve months before such time; all assessed taxes, land tax, and property or income tax assessed on him up to the 5th of April before the date of the order of adjudication, and not exceeding in the whole one year's assessment; all wages or salary of any clerk or servant in the employment of the bankrupt at the date of the receiving order not exceeding four months' wages or salary, and not exceeding £50; all wages of any labourer or workman in the employment of the bankrupt at the date of the receiving order, not exceeding four months' wages, and not exceeding £50. One year's rent is recoverable; for anything more the landlord must prove under the bankruptcy with other creditors. With these exceptions all debts provable under the bankruptcy are paid *pari passu*.

The rule for a public examination in court applies to every debtor respecting whom a receiving order is made, whether such order results in an adjudication of bankruptcy or in a composition arrangement. Composition, formerly a private arrangement, is no longer possible except under a petition, with the approval of the court, and after public examination. A proposal for a composition or scheme of arrangement may be submitted at the first meeting of creditors, but it must also be at a second meeting, but will not be binding unless then accepted by a majority in number representing three-fourths in value of the creditors who have proved. The subsequent meeting will be summoned by the official receiver on seven days' notice, but is not to be held until after the public examination of the debtor is concluded. The composition or scheme must then be submitted to the court, and the court is not to approve it until after hearing the report of the official receiver, and any objections that may be made by or on behalf of any creditor. The court must withhold its approval if the proposal does not appear to be reasonable or calculated to benefit the general body of creditors, or if the debtor has committed any misdemeanour under the bankruptcy law, or under Part II. of the Debtors' Act, 1869. It is also within the discretion of the court to withhold its approval if the debtor has been guilty of any misconduct such as would justify the court in withholding, suspending, or qualifying his discharge, supposing him to be adjudicated a bankrupt.

If a composition or scheme is not accepted and approved, or if the creditors pass a resolution that the debtor be adjudged bankrupt, or pass no resolution, the court will adjudge the debtor bankrupt, and his property then becomes divisible among his creditors, and vests in a trustee.

When a debtor is adjudged bankrupt the creditors may appoint a trustee. Before such person can act, however, he must give security to the satisfaction of the Board of Trade, who have also the right of objecting to the appointment of any trustee should the Board consider him an unfit person to act in the interests of the creditors. He must receive from the Board of Trade a certificate of appointment. During any vacancy the official receiver acts as trustee, and although his duties in this respect cease when a trustee is appointed by the creditors, he still continues to watch the case, and acts, if necessary, in the interests of justice.

A committee of inspection may be appointed by the creditors from among themselves, consisting of not more than five nor less than three members; but if such com-

mittee be not appointed, the Board of Trade will direct the trustee in the matters in which he is required to have the permission of the committee. The remuneration of the trustee is fixed by the creditors or committee of inspection, and is in the nature of a commission or percentage, charged partly on the net amount realized and partly on the amount distributed in dividend. If one-fourth in number or value of the creditors object, the Board of Trade fixes the amount. All bills of solicitors, auctioneers, &c., are to be taxed.

The trustee must, as a general rule, pay all money over £50 into the Bank of England (or an authorized local bank) to the credit of the Board of Trade, and all payments out are to be made by order of the Board. Every trustee is to have his accounts audited not less than twice in each year by the Board of Trade. Such accounts, when audited, are to be filed at the Board of Trade, and to be open to the inspection of creditors. Every trustee must also, not less than once a year during the continuance of the bankruptcy, transmit to the Board of Trade a statement of the proceedings with regard to the estate, and for any misfeasance the trustee is to be called to account by the Board. The creditors may remove a trustee by ordinary resolution, or the Board of Trade may remove him for misconduct. If a trustee becomes insolvent, and a receiving order is issued against him, his office is thereby vacated.

The court fixes a day for the public examination of the debtor, when his conduct and dealings will be inquired into, and when notes of the examination, having been taken in writing, are to be signed by him. After having passed this examination the bankrupt may apply for an order of discharge, when the court is to take into consideration the bankrupt's conduct and affairs, and may either grant or refuse an absolute order, or suspend the operation of the order for a specified time, or grant it subject to conditions with respect to any earnings or income which may afterwards become due to the bankrupt, or with respect to his after acquired property; and the court must refuse the discharge in all cases where the bankrupt has committed any misdemeanour under the Act, or the Debtors' Act, 1869, or any amendment thereof, and must either refuse the order or suspend it, or grant it subject to the aforesaid conditions, on proof of either of the following facts:—

That the bankrupt has omitted to keep such books of account as are usual and proper in the business carried on by him, and as sufficiently disclose his business transactions and financial position within the three years immediately preceding his bankruptcy.

That the bankrupt has continued to trade after knowing himself to be insolvent.

That the bankrupt has brought on his bankruptcy by rash and hazardous speculations or unjustifiable extravagance in living.

That the bankrupt has put any of his creditors to unnecessary expense by a frivolous or vexatious defence to any action properly brought against him.

That the bankrupt has, within three months preceding the date of the receiving order, when unable to pay his debts as they became due, given an undue preference to any of his creditors.

That the bankrupt has on any previous occasion been adjudged bankrupt, or made a composition or arrangement with his creditors.

That the bankrupt has contracted any debt provable in the bankruptcy without having at the time of contracting it any reasonable or probable ground of expectation (proof whereof shall lie on him) of being able to pay it.

The order of discharge will not release the bankrupt from any debt or liability incurred by means of any fraud or fraudulent breach of trust, nor from any debt or liability whereof he has obtained forbearance by any fraud and any undischarged bankrupt obtaining credit to the

extent of £20, without stating he is so, is to be guilty of a misdemeanour.

If a person is adjudged bankrupt while holding the office of member of Parliament, mayor, alderman, councillor, guardian, or member of a sanitary authority, school board, highway board, burial board, or select vestry, his office will thereupon become vacant, and he will be disqualified for such offices and others throughout all parts of the United Kingdom until adjudication is annulled, or he obtain from the court his discharge, together with a certificate to the effect that his bankruptcy was caused by misfortune, without any misconduct on his part.

A creditor who has obtained an execution against a debtor's goods will not be entitled to the benefit thereof unless he has completed such by seizure and sale, and the net proceeds of every execution upon a judgment exceeding £20 are to be retained by the officer charged with the process for fourteen days, and to be paid over to the trustee, if a bankruptcy petition be presented within that time, and the debtor adjudged bankrupt; and every sale under an execution for a sum over £20 is to be made by public auction, and to be publicly advertised on and during three days preceding the day of sale.

The Court of Bankruptcy, the individuality of which was specially preserved by the Judicature Act of 1875, was, by the Act of 1883, merged in the High Court of Justice; but bankruptcy proceedings are under the direction of a judge specially assigned for the purpose. In the provinces county courts exercise the functions of the High Court as regards bankruptcy—appeals, whether from the High Court or county courts, being to the Court of Appeal.

Scotland.—In Scotland the term bankruptcy is applied to the act of subjecting persons to certain ordeals which publish their inability to meet the demands against them. A person who is "notour bankrupt" in Scotland bears a generic analogy to a person who has committed an act of bankruptcy in England. In Scotland, as in England, the bankrupt is liable to the same distributing process, which is there called "sequestration." It is necessary to keep in view that a "bankrupt" and a "sequestered bankrupt" are distinct terms. Every person whose estate is sequestered is necessarily a bankrupt, but every person who is a bankrupt is not a person whose estate has been sequestered.

The criteria by which a person may become a bankrupt have been fixed by certain statutes, the earliest of which now in force is of the year 1696. Various legislative measures were passed for preventing fraudulent alienations by insolvent persons to the prejudice of creditors, and a system for the relief of insolvent debtors was long a branch of the common law as derived from the civilians, and has lately been remodelled by statute. [See *CASSIO BONORUM*.] It was not, however, till the year 1772 that the legislature established a process which, like the bankruptcy system in England, should collect the available assets of a bankrupt merchant into one fund, distribute it through the hands of third parties, and under judicial supervision, among the creditors according to the proportion of the fund to their respective claims, and in the end discharge the bankrupt from his liabilities. Since the year 1772 there has been a succession of Sequestration Acts, of which the latest was passed 29th July, 1856 (19 & 20 Vict. c. 79; amended 20 & 21 Vict. 19; 23 & 24 Vict. 33). The insolvent estates of any person, living or dead, may now be placed under sequestration. Sequestrations may be issued either by the Court of Session or sheriff of the county, and when commenced in the former the process is remitted to the sheriff, before whom the whole judicial proceedings take place. The sheriff appoints a judicial factor, if necessary, until the creditors elect a trustee, in whom the property vests. The creditors also appoint commissioners to advise with the trustee as to the management of the estate. The duties of the trustee and commissioners are nearly identical

with those of the trustee in England, and, as is now the case in that country, the whole procedure in the sequestration is conducted very much at the discretion of the creditors. By the Bankruptcy and Cessio (Scotland) Act, 1881, a discharge cannot be obtained unless a dividend of not less than 5s. per pound has been paid or provided for by adequate security, or unless the court is satisfied that failure to comply with this condition has arisen from circumstances for which the bankrupt cannot be held responsible. Where decisions are subject to review by the Court of Session, the decision of the trustees on claims and resolutions of creditors may be appealed against either to the sheriff or to the Supreme Court.

Ireland.—The Irish law of bankruptcy has been gradually assimilated to the English law.

BANKS, in navigation, are elevations of the sea bottom, and are termed shallows or shoals when they consist of sand or mud, and reefs or ridges when rocky. In charts the sand-banks are marked by dots, and the rocks by small crosses. They constitute one of the chief dangers to navigation, and a full and accurate acquaintance with their situation is required on the part of the pilots employed on the coast and navigable rivers of any country.

BANKS, SIR JOSEPH, was born in London, February, 1743. At nine years of age he was sent to Harrow School, and was removed when thirteen to Eton. He went to Oxford in 1760. His love for botany, which commenced at school, increased at the university, and there his mind warmly embraced the other branches of natural history.

On 1st May, 1766, he was elected a fellow of the Royal Society, and in the summer went to Newfoundland to collect plants. He returned to England the following winter by way of Lisbon. It was after his return that the intimacy commenced between him and Dr. Solander, who, visiting London with strong letters of recommendation, had been recently appointed an assistant librarian of the British Museum.

In 1768 a scientific expedition was fitted out by the government for the purpose of observing the transit of Venus in the island of Otaheite. Banks, in conjunction with Dr. Solander, was appointed naturalist to the expedition, which reached Otaheite in the spring of 1769; and there, during a space of four months, devoted essentially to the astronomical objects of the visit, Mr. Banks acquired an intimate knowledge of the natural history of the interior, as well as of the shores and waters of the island. The expedition quitted Otaheite on the 15th of August, and after traversing the seas surrounding New Zealand and New South Wales, came homeward by the way of Batavia, and reached home on the 12th of June, 1771.

In 1772, in company with Dr. Solander and a staff of assistants, he made a journey to Iceland. The Hebrides, which skirt the north-west coast of Scotland, lay near the track of the voyage, and these adventurous naturalists were induced to examine them. Among other things worthy of notice they discovered the columnar stratification of the rocks surrounding the caves of Staffa—a phenomenon till then unobserved by naturalists—an account of which was published in the same year from Mr. Banks' journal, by Mr. Pennant in his "Tour in Scotland." The volcanic mountains, the hot springs, the siliceous rocks, the plants and animals of Iceland were all carefully surveyed in this voyage; and a rich harvest of new botanical specimens compensated for its toils and expense. But it was not to these objects alone that Mr. Banks confined his inquiries; he purchased at this time a very large collection of Icelandic books and manuscripts, which he presented in 1773 to the British Museum, and he added another collection to it in 1783.

In 1777 he was elected president of the Royal Society, and in 1781 he was created a baronet. In 1782 he lost his friend and fellow-labourer, Dr. Solander, who died of

an apoplectic fit. This loss was a severe blow; and in consequence of it he gave up all intention of proceeding with his botanical work, of writing anything further than a few short memoirs, published either in a detached form or as communications to the Transactions of societies.

On the 1st of July, 1795, Sir Joseph Banks was invested with the order of the Bath, and on the 29th of March, 1797, sworn one of his Majesty's Privy Council. In 1802 he was chosen a member of the National Institute of France.

Towards the close of life Sir Joseph Banks was afflicted by gout to such a degree as in a great measure to lose the use of his lower extremities. He died in 1820. He bequeathed his extensive botanical library and collection to the British Museum.

Sir Joseph Banks published two single tracts—1, "A short Account of the Cause of the Disease in Corn, called by the Farmers the Blight, the Mildew, and the Rust" (8vo 1805); 2, "Circumstances relative to Merino Sheep, chiefly collected from the Spanish Shepherds" (4to, London, 1809). He wrote several papers in the Transactions of the Horticultural Society, of the Linnean Society, and also in the "Archæologia."

BANK'SIA is an Australian genus of plants belonging to the order PROTEACEÆ, of very remarkable habits, and forming a striking appearance in the places where it grows. It was named in compliment to Sir Joseph Banks. It consists of bushes or small trees, with their branches growing in an unbelled manner. The petals of the flowers are wanting; the calyx is four-parted, and each division bears an anther. The leaves are hard and dry, and in young plants always cut at the edges, but in old specimens undivided. These plants are found in sandy forest land, or on rocks, over the whole known continent of Australia, but chiefly south of the tropic. They are called by the colonists honeysuckle trees, and are considered in New South Wales as evidence of bad land, but in West Australia they occupy the most fertile tracts. Many species are now cultivated in the conservatories of Europe, where they are much esteemed for their handsome foliage and singular heads of flowers—"like bottle-brushes." None of them appear to be of much value for timber. *Banksia compar* and *Banksia serrata* (which last is said to grow 30 feet high, with a stem measuring a foot and a half in diameter) are the largest species which have been mentioned by travellers on the east coast. On the coast in Western Australia *Banksia grandis* reaches 50 feet in height, with a trunk 2½ feet in diameter. A considerable quantity of honey is secreted by their flowers, and collected by the natives of King George's Sound, who are extremely fond of it.

BANK'URA, a district of British India, in the Lieutenant-governorship of Bengal, lying between 22° 54' and 23° 37' N. lat., and between 86° 49' and 87° 35' E. lon. Its area is 1346 square miles; population, 540,000.

The district forms the connecting link between the plains of Bengal on the east and the highlands of Chutia Nagpur on the west. In the east, where it adjoins Bardwan, the scenery presents the ordinary features which characterize the lowlands of Bengal. The country is flat, and the land alluvial and well suited for the cultivation of paddy. Proceeding in a westerly or northerly direction, the character of the scenery gradually changes, the land becomes more and more undulating, while patches of jungle and rocky boulders appear, succeeded by forest-crowned hills, which gradually increase in height until they reach an elevation of more than 1400 feet above the sea-level. Of these hills the most prominent is Sinsuina (1442 feet), which forms a prominent feature in the landscape. It is quarried on its southern face. The dense jungle which covers this hill and the western part of the district generally, is the home of tigers, leopards, small but fierce bears, and many other wild animals, and shelters the cobra and every variety of Indian snake. Here, too, large supplies of

lac and tasar are obtained, the gathering of which gives occupation to the poorer classes of the people, especially the Santals and Bauris. The principal rivers of the district are the Damodar and the Dhalkisor or Dwarakeswar, which, although insignificant streams during the hot weather, become navigable in the rains (from the middle of July to the middle of October) by boats of from 50 to 60 tons burden. At times, during the rainy season, these rivers rise so suddenly, owing to the flow of rain-water from the neighbouring hills, that a head-wave is formed, called the *kurpa ban*, not unlike the *bore* or tidal wave in the Hooghly, which often causes loss of life and great destruction of property.

The principal crop in Bankura, as throughout the rest of Bengal, is rice. The *aman* or winter crop is sown in April or May, transplanted in July or August, and reaped about December; the *aus* or autumn rice is sown broadcast in May, and reaped in September. Among the other crops raised in the district are oil-seeds, mustard, pease, grain, cotton, flax, hemp, indigo, sugar-cane, and *pan*. Irrigation is necessary for all kinds of crops in Bankura, and is effected by means of wells and tanks where natural water-courses and streams are not available. On all lands growing sugar-cane and other exhausting staples rotation is observed, the cane being generally followed by *til*, after which a crop is taken of *aus* or autumn rice, succeeded by mustard (often mixed with pease). As in other parts of Bengal, the land is let and sublet to a great extent, many middlemen coming between the proprietor and the cultivator.

The district is subject to drought, occasioned by a deficiency in the rainfall, which is attributed to the indiscriminate clearing of the jungle. As there are very few patches of low marshy land in the district which retain moisture for a considerable time, a year of general drought results in serious calamity.

The principal manufactures of the Bankura district are silk and cotton fabrics. The chief articles of export are rice, oil-seeds, cotton, and silk cloth, silk cocoons, and lac; the imports are English piece-goods, salt, tobacco, spices, &c.

The climate of Bankura is oppressive and relaxing in the hot season, but from October to the end of February it is bracing and enjoyable; during the rains the district is not so damp and unhealthy as those further east. Inter-mittent fever is common in Bankura, as in other districts of Bengal. Leprosy, diarrhoea, and dysentery are also common. Cholera is almost always present in a sporadic form, and sometimes becomes epidemic.

BANKURA, the administrative headquarters of the above district, is situated on the north bank of the Dhalkisor river. It contains, besides the usual public buildings, courts, treasury, post-office, jail, &c., a church, government school, and public library. The library is supported by subscriptions, contributed chiefly by European and native officials. The station is dry, and is regarded as very healthy. Considerable trade is carried on, the chief exports being rice, oil-seeds, lac, cotton and silk cloth, silk cocoons, &c., and the principal imports English piece-goods, salt, tobacco, spices, cocoa-nuts, and pulses. The population is 16,000.

BANN, a river in Ireland, which rises as the Upper Bann in the county of Down, about 8 miles E. of the town of Newry, in the high lands near the coast. It flows N.W. to Lough Neagh, which it enters near the S.W. corner, and issues from the N.W. corner as the Lower Bann, flowing through Lough Beg, and thence nearly N. to the North Sea, which it joins about 4 miles N.W. of Coleraine, and about 75 English miles, measured in a direct line, from its source. There are some good salmon and eel fisheries in the Lower Bann.

BAN'NER (akin to **BAN** in origin), a piece of drapery attached to the upper part of a pole or staff, generally

hanging loose, but sometimes fixed in a slight framework of wood. To complete the idea, the piece of drapery must be regarded as in some way indicative of dignity, rank, or command, or as carried on some occasion with which ideas of dignity are connected. The size and form are mere accidents, as indeed is the material, though the drapery usually consists of some costly stuff, the most usual material being a soft silk called taffet. Banners are sometimes plain and of one uniform colour, but more usually ornamented with tassels and fringes, or decorated with some figure or device having reference to the person or community by whom it is raised, or to the occasion on which it is displayed. The term *standard* is usually applied to the principal banner of an army, the national banner, or a banner set up by some chief as a rallying point for his adherents. *Colours* is the name applied to the banners borne by particular regiments. A *flag* is a banner displayed on board a ship, especially as a signal. A *pennant* is a narrow flag with a long streaming tail, used to denote the vessel which carries it to be a national vessel, or man-of-war. This is sometimes written *pennon*, and a small pendant is distinguished as a *pennoncille* or *penail*. *Ensign* is a word formed on the idea of the banner displaying *insignia*, and formerly used where we now say *colours*. The officer now called an ensign was formerly the *ensign-bearer*. This name is now applied to the national colours carried over the stern of a ship. *Streamer* is a poetic word applied to all kinds of floating banners.

The military standards of the Romans were not banners, but carvings in metal or wood, of an eagle or some other figure, elevated on a tall lance or pole. The Persians used a similar standard; and though we know but little of the standards of other nations of antiquity, there is no reason to suppose that banners, as we understand the term, were used by them.

But the celebrated *labarum*, or standard of Constantine, the first Christian emperor, was a true banner. It was a long pike intersected by a transverse arm making a cross, whence hung a silken banner, embroidered with portraits of the emperor. The summit of the pike bore the sacred monogram giving the Greek initials of the name of Christ. Succeeding emperors carried the *labarum* also, and it figures on their medals, with the legend *Hoc signo vincaris*, "With this sign (the cross) shall ye conquer." When the empire degenerated so that victory was no longer hoped for, but mere defence was alone sought to be accomplished, the *labarum* was deposited in the palace at Constantinople as a relic. This was about 825 A.D.

The first notice of banners in England occurs in Bede's account of the interview between Augustine and Æthelberht, when the followers of Augustine are described as bearing banners on which were displayed silver crosses and the picture of Jesus Christ. Thus early were they used, as they continue to be by Roman Catholic countries, to add to the pomp of religious processions. The English monasteries had banners which were displayed on great anniversaries, and occasionally lent for use in the field; and some of these, besides a representation or symbol of some particular saint, contained highly valued relics. This was the case with the celebrated banner of St. Cuthbert at Durham, which had the reputation of securing victory to those who fought under it, and was borrowed on this account by the Earl of Surrey, for use in an expedition to Scotland, early in the reign of Henry VIII. The *oriflamme*, so frequently mentioned in the chronicles and romances of the middle ages, was the banner of St. Denis, and was borrowed from the Abbey of St. Denis, near Paris. It was a flame-coloured banner, without embroidery, divided below into three parts, and fastened to the lance with loops of green silk.

The banners of the middle ages formed a link between the military and the ecclesiastics, between the affairs of

war and the sentiments and feelings of religion; and this connection may be traced even to our own times. The pope still sends consecrated banners where he wishes success, and even in Protestant countries it is not unusual to have regimental colours blessed by a minister of religion; while the banners of the knights of the Garter and the Bath are hung respectively in the chapels of St. George at Windsor, and Henry VII. at Westminster; churches are still the depositories of banners taken from the enemy; and banners are yet suspended over the tombs of military or naval men of distinction.

The national banner of England, that of her patron saint St. George, consisting of a plain red cross upon a white ground, is a religious one; and whatever other banners were carried, this was in former times always foremost in the field. The *union-flag* is formed by a combination with it of the crosses of St. Andrew and St. Patrick, the patron saints of Scotland and Ireland. The lions borne as the arms of England are the personal achievement or heraldic insignia of our kings, and appear, from the time of Richard I., to have been always carried near the person of the sovereign when engaged in war. Other personal devices and cognizances have been frequently used in like way, as, for instance, the white rose of the House of York by Edward IV.

In thus carrying their personal banners into the field, the kings were imitated by the earls and other persons of distinction who led their dependents into the field in feudal times. Heraldry was then, far more than now, a necessary art; for when the figure was completely cased in steel, and the face concealed by the helmet, the heraldic insignia displayed upon their shields, surcoats, and banners afforded the only sufficient means of distinguishing one knight from another, and the banners were especially necessary to enable the soldiers to follow and rally round their respective leaders. An interesting exhibition of this custom is presented in a French poem of the reign of Edward I., relating to the siege of Carlaverock, in which we have a catalogue of the chiefs who were present, and of their heraldic insignia, which may rival in extent and minuteness the catalogue of the chiefs at the siege of Troy. As the feudal constitution of the army gave way, the use of private banners disappeared; but in the Parliamentary army they were resumed, their devices being of a new character, in accordance with the spirit of the times, often conveying some moral or religious sentiment. Distinguished persons were early attended by a banner-bearer, or *bannerer*, whose office was considered one of peculiar trust. The post of standard-bearer of England, especially, was one of high honour from an early period.

The standard used in the eleventh and twelfth centuries, being too large to be wielded by a single hand, was sometimes fixed in a scaffold resting upon a car drawn by oxen, while at the foot of the mast a priest celebrated mass every day, and ten knights, attended by as many trumpets, kept watch upon the scaffold night and day. Such a cumbersome machine was used at the great battle of the Standard, in the reign of Stephen.

Huge standard poles carrying banners were also the rallying-points for the armies of the great mediæval Italian republics; fixed in a car, the *carroccio* of the state, they were drawn to the battle by oxen. To lose the *carroccio* was the last disgrace, and such a disgrace befell Florence at Montaperti's famous fight in 1260; to be still further emphasized on the part of the victorious Siensese by the planting of the captured standards one on each side of the great choir-arch of their cathedral, where, at Siena, they remain to this day.

While their chief use was as rallying-points, banners were also employed as signals from a very early period. They were also carried by heralds, and the pennon-quarree of a banner formed, as now, the drapery of a trumpet. Banners,

with inscriptions or intelligible devices, have been used in all popular insurrections as a ready means of acting upon the minds of a multitude. In all pageants, at tournaments, coronations, and funerals, they have been extensively used; and corporations and trading companies still employ them.

When the drapery of the banner was allowed to float in the air, it was usually either square or extended to a considerable length and divided at the extremity, forming the swallow-tailed banner. That of William Rufus was of the latter form, while his father's appears to have consisted of three shreds attached singly to the pole.

BANNERET, a very ancient English title of dignity, but now entirely extinct. It denoted a degree which was above that expressed by the word *miles* or *knight*, and below that expressed by the word *baro* or *baron*. Many writs of the early kings of England run to the earls, barons, bannerets, and knights. When the order of baronet was instituted, an order with which we must be careful not to confound the banneret, precedence was given to the baronet above all bannerets, except those who were made in the field under the banner, the king being present. The banneret was a knight so created in the field, and this honour was conferred usually, but not always, as a reward for some particular service. Thus, in the fifteenth of King Edward III., John de Copeland was made a banneret for his service in taking David Bruce, king of Scotland, at the battle of Durlam. Sometimes the grant of the dignity was followed by the grant of means by which to support it. The rank of the banneret is well understood, but what particular privilege he enjoyed above other knights is not now known.

BANNOCKBURN is a *quoad sacra* parish and village within the *quoad civilia* parish of St. Ninians, county of Stirling, two miles S.S.E. of Stirling, and on both sides, but principally on the east side, of the brook or *burn* Bannock, which runs into the Forth below Stirling. The village is long and straggling. The manufacture of Scotch and Brussels carpets and tweeds is carried on rather extensively. Freestone quarries are also worked, giving employment to some hundreds of hands, and coal is still wrought, though not so extensively as formerly. Bannockburn House, a stately old pile, is in a good state of preservation, and is celebrated as having lodged Prince Charles Edward previous to his invasion of England, and during his retreat therefrom. The village has an annual cattle and horse fair of considerable importance. The population in 1881 was 2549.

Bannockburn is remarkable in history for the great battle fought there on the 24th of June, 1314, by which the independence of Scotland was established. Robert Bruce had succeeded in throwing off the yoke of England so firmly established by Edward the Great, and so weakly held by his feeble successor Edward II., and had already invested Stirling, the last of the great fortresses to yield to his attack, before Edward moved. Thirty thousand horsemen formed the fighting part of the English king's army, to which a mighty host of wild marauders had been joined, summoned from savage Ireland and wild Wales. Bruce's army was almost all of footmen. For the second time in history the famous "British square" appeared in fight; Wallace, at Falkirk, was its inventor, and only Edward the Great (at that same fight) ever broke it. Century after century it has done service. With it Waterloo was won, and Ulundi (1880) saw countless hordes of Zulus break wave after wave against its unmoved cliff. Bruce's handful of horsemen dispersed the bowmen with whom Edward II. attempted to repeat his father's successful Falkirk attack, and the English knights, brave as they were, shared the fate of the French cavalry at Waterloo in their fierce charges against Bruce's square, repeated till the field was full of plunging wounded steeds and powerless riders. A body

of camp followers appeared on the hill by Bruce's standard, and the English, thinking they were large reinforcements, took panic and recoiled. Bruce seized the moment, and turned it into a complete rout. Edward escaped to Dunbar with difficulty with 500 knights; but the flower of the English knighthood perished by the hands of the peasantry most miserably. "For centuries after, the rich plunder of the English army left its traces on the treasure and vestment rolls of castle and abbey" (Green's "Short History of the English People," 1876, p. 207). The numbers which fell on both sides in this great battle are variously estimated. Some of the Scotch historians compute the loss of the English at 50,000. This, however, includes those who were killed in the flight. 154 lords and knights, and 700 gentlemen of rank, are known to have fallen, and probably nearly 30,000 soldiers. The Scots lost 8000 men on the occasion. The Bore Stone, the traditional position of King Robert Bruce's standard, on an eminence near the field of battle, is to be seen there to this day. Sauchie, in the immediate neighbourhood, is the place where James III. was defeated (1488) in an engagement with his rebellious subjects. In attempting to escape the unfortunate king fell from his horse into the Bannock, and was assassinated by an insurgent trooper, who declared that he was a priest, and offered to confess the king.

BANNS. See BAN, MARRIAGE.

BANNU, a district of British India, in the Lieutenant-governorship of the Punjab, lying between 32° 10' and 33° 15' N. lat., and between 70° 26' and 72° E. lon. Its area is 3786 square miles, and the population 300,000. The civil station and headquarters of the administration are at the town of Edwardesabad, situated near the N.W. corner of the district.

The Indus, passing through the district from N. to S., divides it into two distinct portions. Westwards from the river, after a strip of open plain, the country rises rapidly into a range of hills—the Khatak-Niazai or Maidani range—in which one peak, that of Sukha Zakrat, rises to a height of 4745 feet above the level of the sea. Beyond lies the valley of Bannu proper, stretching to the frontier hills, an irregular oval, measuring 60 miles from N. to S., and about 10 miles from E. to W. Gift in by mountains, the valley itself is open and comparatively level, having a soil composed of thick deposits of lacustrine clay, mingled more or less with sand. Towards the S. and E. the sand in places completely smotheres the subsoil of clay. Northwards the country is closely cultivated and thickly dotted with villages, trees, and gardens, while irrigation channels, flowing between grassy banks, impart an unusual air of freshness. On the northern confines of this district the Indus expands at once into a wide and open river. To the east lies a level plain, a portion of the central Punjab wilderness. It is shut in towards the north-east by the Salt Range, which is barren and unproductive, and its drainage is carried down in short-lived torrents, which are rapidly swallowed up by the thirsty soil at its base.

The Mohammedans outnumber the remaining population of the district in the proportion of nearly ten to one. Foremost among them, both numerically and in respect of political importance, stand the Afghans or Pathans, who number 42 per cent. of the total population of the district. The most important Afghan tribes are Khataks, Waziris, Lohanis (Marwats, Niazais, and others), and Bannuchis. The Khataks are found in the Khatak-Niazai range and along the northern border of the district towards Kohat. The Waziris are settlers upon the western frontier, and are only half reclaimed from their mountain life beyond the border, to which indeed they return during the hot summer months. They are a tall and robust people, possessed of many manly virtues, fairly industrious as cultivators, and regular taxpayers. The Marwats, inhabitants of the lower

and more sandy portions of the Bannu valley, are one of the noblest races of the north-west. Frontier Pathans of pure descent, they are naturally haughty and of a fiery disposition. In person they are tall and muscular, in bearing frank and open. Almost every officer who has administered the affairs of the district has left on record a favourable mention of them. They are now excellent agriculturists. To these the Bannuchis form a painful contrast. They are probably of mixed descent, and exhibit every Afghan vice without possessing the compensating virtues of constancy and self-respect. They are small in stature, sallow and wizened in appearance, and in disposition mean and revengeful. They are, on the other hand, industrious cultivators, and have been uniformly quiet and submissive subjects to the British government since the annexation of the country.

A great part of the district has been brought under cultivation since the introduction of British rule. In Bannu proper (the country of the Bannuchis) every acre is under the plough, and the call upon the soil is incessant. The free use of manure and inundations from the fertilizing rivers enable the same fields to bear two harvests year after year—wheat or barley in the early summer, millets, pulses, cotton, Indian corn, and sugar-cane, with a little rice, in the autumn. The same crops, excepting rice, form the staples of cultivation in all parts of the district.

Cultivation is chiefly carried on by peasant proprietors, and money rents between servant and landlord are rare. There are no large proprietors, and the land is minutely subdivided.

The climate is marked by the usual Punjab characteristics of extreme heat during the summer months and considerable cold during the winter. The Edwardesabad cantonment, and the irrigated portion of the Bannu valley generally, are extremely unhealthy, intermittent and remittent fevers being especially prevalent. Disease of the spleen is also very common among the Bannuchis. The rainy months are those of July and August.

BANQUETTE, in fortification, is a step formed of earth at the foot of the interior slope of a parapet, and extending along its whole length, except where intervals are left for placing artillery to fire through the embrasures. It is formed either on the natural ground or on a rampart, and is usually 3 feet high; or, since troops are to stand upon it in order to fire over the parapet, its upper surface or tread is 4 feet or 4½ feet below the level of the crest of that part of the work. The tread is from 3 feet to 4 feet broad, and the rear side is generally formed with a slope whose horizontal breadth is equal to twice the height, in order that the men may easily ascend or descend. In some cases the ascent is by steps formed on the rear side; and when the parapet is more than 7½ feet or 8 feet high the banquette is often double, or a horizontal tread from 1 foot to 3 feet broad is formed at the middle of the slope. The term *banquette* is also used as the name for the uppermost compartment of the French diligence, in front, where the conductor sits.

BAN'SHEE or **BEN'SHI**. In the legendary history of Ireland, and also of Scotland, this was the name of a fairy, formerly believed to appear in the shape of a diminutive old woman, and to chant in a mournful ditty, under the windows of the house, the approaching death of some one belonging to the family of any great personage.

BANSTEAD, a village of Surrey, 16 miles from London by the South-east Railway, is situated on the slope of the chalk downs, famous for their healthy air and excellent pasturage. The church is principally perpendicular in style, with a tower surmounted by a tall spire. The Banstead Downs are 376 feet above the sea-level, and the Epsom Downs are a continuation of them on the west; their geological position is between the London clay on the north and the chalk formation on the south. About a

mile north of the village is Lambert's Oaks, which formerly belonged to the twelfth earl of Derby, the founder of the "Oaks" stakes at Epsom races.

BANTAM', the earliest Dutch settlement in Java, and at one time a seat of considerable trade, but which is now decayed and in ruins. It is situated at the north-west extremity of the island, on the Bay of Bantam; and being surrounded by jungle and intersected by almost stagnant streams, it is exceedingly unhealthy.

BANTAM FOWL, a well-known variety of the common domestic fowl, originally brought from Bantam, in Java. It is of very small size, but the cock is even more pugnacious than the game cock.

BANTRY, a town of Ireland in the county of Cork, is situated at the head of Bantry Bay. The harbour is large, safe, and commodious, but is little used except for the fishery and the export of corn and other agricultural produce. The town is ill built, and consists principally of two streets leading to the bay.

BANTRY BAY is a deep inlet on the S.W. coast of Ireland, between Sheep Head and Dursley Island, in the county of Cork. It is 21 miles in length and 5 broad, safe and commodious for ships of any size, and free from dangerous rocks and shoals. At the head of the bay are

two harbours. One, on the south side, opposite Bantry town, and within Whiddy Island, is called Bantry Harbour, which is quite landlocked, and perfectly secure from all winds. The other, to the northward, is called Glengariff Harbour; it is small, and the entrance narrow. This is also sheltered by a small island, but from being so confined is seldom used by any other than coasting vessels. In summer, however, the largest ships may ride in safety outside the island. Near the entrance of Bantry Bay, on the north shore, is an excellent harbour, large and well sheltered, with water sufficiently deep for the largest ships. It is called Bear Haven, and is formed by Bear Island, at each end of which there is an entrance, and good anchorage everywhere within it, though the best is off Balmakilly. This harbour is well adapted for the rendezvous of a fleet, being near the sea, easy of access, spacious, and safe. An indecisive action was fought in it on the 30th April. 1689, between a portion of the French fleet that conveyed King James to Kinsale, and the English fleet under Admiral Herbert, afterwards Earl of Torrington. It was in Bantry Bay also that the French fleet, with General Hoche on board, anchored in 1796.

BANYAN TREE (*Ficus Indica*) is a native of most parts of India, both on the islands and the mainland. It



Banyan Tree.

is found in its greatest perfection and beauty about the villages on the skirts of the Circar Mountains. The wood is light, white, porous, and of no value. Brahmans use the leaves as plates to eat off; bird lime is manufactured from the tenacious milky juice. The branches spread to a great extent, dropping their roots here and there, which as soon as they reach the ground rapidly increase in size till they become as large as and similar to the parent trunk, by which means the quantity of ground they cover is almost incredible. Some trees are quite 100 yards round the circumference of the branches, and 100 feet high, the principal trunk being more than 25 feet to the branches, and 8 or 9 feet in diameter.

BA'OBAB. See ADANSONIA.

BAPAUME, a town of France, in the department of Pas de Calais, is situated near the source of the Sensée, 15 miles S. by E. from Arras. It is a well-built fortified town, with 3091 inhabitants, who manufacture lawn, muslin, calico, thread, soap, and leather. A battle was fought near the town on the 2nd and 3rd January, 1871,

between the French army of the north, under General Faidherbe, and the Germans, under General Manteuffel. Both sides claimed the victory, but the French were compelled to fall back on Arras and Douay.

BAPTISM, a well-known ceremony or ordinance of Christianity: one of the two sacraments of the English Reformed Church.

When baptism, as a religious rite, was first practised, is a question on which the opinions of the learned have been divided. Some early Jewish writers speak of it as a custom of their nation from very ancient times. We possess, however, the most authentic information that in the reign of Tiberius there appeared on the banks of the river Jordan a prophet whose name was John, who called upon the people of Judea to adopt stricter rules of life, to expect the immediate coming of the kingdom of heaven, and to repent. Great multitudes attended the preaching of John. He required of those who became his disciples that they should be *baptized*. This was done in the river, and the meaning of the rite seems, in this case, to have pointed to the

necessity of repentance, and the practice of a more rigid morality, as preparatory to the appearing of the Messiah and his kingdom, which was announced to be at hand. On account of his requiring his proselytes to submit to this rite, the name of the Baptist was given to him. Among those who acknowledged John as a divine prophet, and received baptism at his hands, was Jesus of Nazareth, the long-expected Messiah, at whose baptism there was a supernatural appearance in the air, and a voice heard, which declared him to be the "beloved Son of God, in whom he was well pleased." John also bore his testimony that Jesus was the Messiah. Jesus, under the especial direction and with the peculiar assistance of the Most High, founded that great church or community in which so large a portion of the human race are now comprehended, and appointed that admission into this church should be by the rite of baptism.

It is remarkable that he did not himself baptize. But while he was employed in diffusing that new and sacred truth which he came to communicate, and in the performance of those miracles by which his claim to be a divine teacher was established, his apostles and others of his more eminent disciples did baptize, and many flocked to their baptism (John iv. 1, 2). This was done under the eye and with the concurrence of their master; but after his resurrection he gave a more direct sanction to the practice, and in fact established the rite as a perpetual ordinance in his religion, saying to his apostles—"Go ye therefore and teach all nations, baptizing them in the name of the Father, and of the Son, and of the Holy Ghost: teaching them to observe all things whatsoever I have commanded you" (Matt. xxviii. 19, 20). The apostles acted according to this injunction. The rite was regarded by them and the first Christians as an instituted ordinance of the Christian Church. The meaning of Christian baptism differed little, if at all, from the baptism of John. It implied repentance and faith in Christ. The washing was no inapt symbol of this change. When formally administered by some officer of the Christian Church, and in the presence of a Christian assembly, it was an outward and visible sign that the convert took upon himself the profession of Christianity, and was acknowledged as a member of the church.

Whether the rite was originally performed by complete immersion is the subject of controversy. The words *baptism* and *baptize* are Greek terms, which imply, in their ordinary acceptation, *washing* or *dipping*. The question, however, is not whether entire immersion were the practice in the primitive church, but whether it was regarded as so essentially a part of the ordinance that there could be no baptism without it. This is one of the points of disagreement between the Greek and Latin churches.

In the Christian Coptic churches of Egypt at the present day tanks for ablution exist in every church. In Abou Sergeh, besides the well and sink in the choir, there is a tank 8 feet square in the women's compartment, and a large deep one about 8 feet long and 6 feet wide in the part of the church called the *narthex*. [See BASILICA.] These are generally covered with loose boards. The large one in the *narthex* is called the "Epiphany tank," and is used about midnight on the eve of the Festival of the Gheetas, when the male part of the Coptic congregation plunge into it to commemorate the baptism of Christ. The smaller tanks were used for ablutions before the services, and also for a ceremony on Mandy Thursday, when the priest washes the feet of some of the congregation. A somewhat analogous custom existed in early times in the Western Church. In the atrium of the early Roman basilicas there was a well at which the congregation washed before entering the church. Examples still exist, among others, in Rome at San Clemente, and in Milan at Sant' Ambrogio.

The ceremonies attendant upon baptism during patristic times were of a very elaborate character. The ordinary administration of the rite was limited to the two festivals of Easter and Whitsuntide, the name Whit-Sunday being derived from the white garments worn by those who were baptized. The candidates were called upon to renounce the devil and all his works (a form still observed by the sponsors in the Church of England), and were then exorcised by the priest, who laid his hand upon their heads, and breathed into their faces. They were then anointed with oil, that they might as wrestlers contend for the truth; the ears and nostrils were touched with spittle, signifying that the ears should be ever open to the truth, and that the believer should live in the odour of virtue. The water of baptism was consecrated, and the candidate was immersed or sprinkled three times, in reference to the three persons of the Trinity. After baptism the neophyte tasted of milk and honey, and also of salt, was again anointed with oil, and was then clothed in a white robe—a symbol of the purity and innocence of soul he had attained—and a band was placed round his head. The usage varied slightly in different countries, and additional ceremonies were added in some of the churches.

The ceremonies of exorcism, the touching of the ears and nostrils with spittle, the placing of salt in the mouth, anointing with oil in the form of a cross, and the pouring of water three times, are still retained in the Roman Catholic Church, but are rejected as pertaining to superstition by the various Protestant churches, though the anointing with oil and the use of the white robe were retained by the Church of England for some time after the Reformation.

The Church of England still retains the signing the infant with the sign of the cross, as a token that it is hoped it will become a good soldier of Jesus Christ. The Scotch rejected it with the other ceremonies, and it is also omitted by the various independent churches. The Society of Friends rejects outward baptism altogether, considering it entirely a spiritual matter.

The opinion of the Christian world has been much divided with respect to the time of life at which it is proper to administer the ordinance. When Christianity addresses herself to the unconverted, the proper time evidently is whenever the faith and repentance necessary are perceived to be complete; but the case of nations which are already Christianized is different. There is nothing in the New Testament which relates to the baptism of the offspring of parents themselves Christian, but only instructions as to the baptism of converted persons, leaving us without an authoritative direction in the case; so that it was natural for the first converts, who were Jews, to infer an analogy between this rite and circumcision, the initiatory rite of Judaism, which, by the divine command, was to be performed in infancy, and which brought the person who received it within the scope of the promises to Abraham and his seed, as baptism did within the scope of the promises to believers in Christ. Further, we read in the Scriptures of whole households being baptized at once; so that infant baptism certainly did prevail in the church at a very early period. The reasons adduced in favour of adult baptism are fully given in the article BAPTISTS.

When baptism was received as a permanent ordinance of the Christian Church suitable places were provided, called baptisteries, which in some instances preceded churches. Such are the fine baptisteries of Pisa, Florence, &c. [See BAPTISTERY.] Of these baptisteries it is believed none remain in England; but in many of the larger churches of England a portion of the building is set apart for the performance of this rite, and contains the *font*, so called from *fons*, a fountain, perhaps in reference to the original baptisteries, the springs or running streams of the East, or as the Spring of that water which was supposed to be life-giving. The maintenance of a font in the church for baptism is a

enjoined on every parish. The old fountains of England have capacious basins, large enough to receive the entire body of the infant. It was the practice of the English Church from the beginning to immerse the whole body (Fuller's "Church History," p. 109). Since the latter part of the sixteenth century the baptism of infants by immersion has been almost entirely disused in England, although the church service requires to this day that if "the child may well endure it" the priest shall "dip it in the water discreetly and warily;" "it shall suffice to pour water upon it" only in the case where the sponsors shall "certify that the child is weak," a certification which is now always taken for granted. It has always been an object with the authorities in the Church of England to enforce the attendance at the public font in the church. Private baptism is rather connived at than allowed. In cases of sickness or hazard of life the clergyman is not to perform the full service, but only so much as may be useful, for satisfaction that the child, if it dies, die not unbaptized. The friends of the infant must still repair to the church for the completion of the ceremony. In Scotland the baptism of infants is frequently performed at home, though generally there is some particular cause for it.

The question as to the validity of lay baptism is one about which much controversy has existed. It has always been admitted that where the services of a priest or of a minister could be obtained the administration of the rite should be left to the clergy; but, on the other hand, the vast importance attached to baptism by many sections of the church has from a very early period caused lay baptism to be admitted where no other is possible. By the Church of Rome this is admitted to the fullest extent, and midwives are even allowed in cases of danger to baptize a child before the birth is completed. In the Church of England lay baptism was permitted after the Reformation until 1575, when the power of administration was restricted to "lawful ministers;" but the validity of lay baptism is generally accepted at the present time. Another question that has been frequently discussed is that relating to baptism administered by heretics, but the validity of this, where the proper formula has been used, is generally admitted.

In the ceremony of baptism in the Church of England, and also in the Church of Rome, it is requested that there shall be *sponsors*, from *sponden*, to promise, or in our old Saxon tongue, *godfathers* and *godmothers*, who pledge themselves that the child shall be brought up in the Christian faith, but the practice is rejected by the Presbyterian and Dissenting churches.

Another incident to baptism, as administered in the English Church, is the giving a name to the child. In this Christians seem to have followed the example of the Jews, who assigned a name when the rite of circumcision was performed. The name thus given during the performance of one of the sacraments is appropriately called the Christian name. The surname, or name of addition, is not on this occasion mentioned; in fact, the modern surname is of comparatively recent growth [see *SURNAME*]; and it is observable that though there are frequent instances of the change of the surname in after life, the instances are extremely rare of any change in the Christian name.

BAPTISTERY, an ancient building in which Christians performed the ceremony of baptism. The most celebrated existing baptisteries are those of Rome, Florence, and Pisa; the most ancient is the Baptistery of S. Giovanni in Fonte, near the church of S. Giovanni Laterano at Rome, commonly said to have been erected by Constantine the Great. The plan of this building is an octagon, with a small portico at the entrance; the interior is decorated with eight most beautiful porphyry columns, the finest of the kind in Rome. The diameter of this structure is about 75 feet. The Baptistery of Florence, which is octagonal, with a diameter of about 100 feet, stands

opposite to the principal entrance of the cathedral, but is much the older building, and is alluded to by Dante as "il mio bel San Giovanni," since it was dedicated to St. John, even in his time. The three great bronze doors, sometimes called the "gates of paradise," and the work of ANDREA PISANO and GIMBERTI, are celebrated for the beauty of their bas-reliefs. The Baptistery of Pisa, erected between the years 1152 and 1160, by Diotisalvi, is of singular and exquisitely beautiful design. The plan is circular, with a diameter of 116 feet; the building is raised on three steps, and surmounted with a dome in the shape of a pear. The external elevation is divided into three stories. The multangular edifices placed at the sides of cathedrals, which are called chapter-houses, are very similar in plan to the ancient baptistery. It is possible they were originally used for that purpose. Occasionally temporary baptisteries were erected when some convert of note was to be admitted to full communion with the church. Thus, A.D. 627, Edwin, king of Northumberland, was baptized in such a structure. The reservoirs in baptist churches are sometimes named baptisteries.

BAPTISTS, a religious sect, and, in England, one part of the body known by the general name of The Three Denominations of Protestant Dissenters. As the name implies, they hold peculiar views on the subject of baptism, maintaining that this Christian rite ought to be administered by immersion, and not by sprinkling, at such an age that the ordinance can be regarded as the profession of the baptized person's own faith; and not in infancy. Such they believe was the practice of the apostolic times. In the vindication of their mode of performing the ordinance, they lay great stress on the original word *baptizō*, which signifies, as they contend, nothing but immersion. They defend the postponement of the rite from the words of the baptismal commission, in which the apostles are commanded to teach before they baptize. "Go ye therefore and teach all nations, baptizing them in the name of the Father, and of the Son, and of the Holy Ghost." The reception of the gospel being thus assumed as an indispensable qualification for baptism, the Baptists require that all to whom they administer it should repent of their sins, believe in Christ, and joyfully receive the word. A profession to this effect is made by most persons who are baptized in their communion. The question of baptism was brought before different councils in the fifth century, whose decisions were given in favour of infant baptism. The opposite opinions were therefore anathematized; and those who held them incurred the penalties attached to heresy. The schism which led to the formation of the Greek Church did not remove the cause of controversy concerning baptism, but, on the contrary, increased it by the intolerant proceedings which were taken against those who refused to be silenced. The number of those who professed the offensive tenet in the beginning of the twelfth century are said by Mosheim to have amounted to 80,000. From this time to the commencement of the Reformation, Germany was the chief seat of the Baptist reformers; from whence, following the course of the Rhine, they spread over Holland. Till then the doctrine, though so long and tenaciously maintained, appears not to have led to any particular designation being bestowed upon those who held it. Their existence as a distinct sect commenced in Germany in the days of Luther, under the name of *ANABAPTISTS*. The doctrine was blended with principles so fanatical and lawless, that none who had respect for the morals and order of society dared to avow it; and consequently the advocates for baptismal immersion are averse to the name of *Anabaptists*. Little is known of the Baptists in England before the sixteenth century. Their name then appears among the various sects who were struggling for civil and religious freedom. We do not hear of any congregation of Baptists in this country before 1607. They

now subsist under two denominations, General Baptists, and Particular Baptists. The latter designation is given to those who hold Calvinistic views, and who are in every respect but their distinctive doctrine the same as the Independents. The General Baptists maintain the doctrine of universal redemption; but they are divided into the Old Connection (Unitarian), and the New Connection (Trinitarian), the latter by far the more numerous. Among both the Particular and General Baptists there is another ground of separation, relating to the terms of communion at the Lord's Supper. Some churches (each society or congregation is a church) do not allow persons who have not received baptism according to their views of it to join with them in the celebration of this rite. Of this number are some of the Particular Baptists, and all the New Connection of General Baptists. Others, however, do not scruple to meet, on that occasion, not only those of the Baptist persuasion who hold other opinions widely different from their own, but even persons who do not embrace the Baptist tenet, provided their religious faith is in other respects, as they conceive, orthodox, and their lives conformable to their profession. This is called free communion. The tolerant spirit which it cultivates is making rapid progress through the whole denomination. In 1885 the Baptists had 2600 chapels, and 300,000 members in Great Britain. In other countries throughout the world there were in the same year 29,000 churches, and 2,600,000 members.

BAR (in French, *barreau*) is a term applied, in a court of justice, to an inclosure made by a partition of timber, with the view of preventing the persons engaged in the business of the court from being incommoded by the crowd. It has been supposed to be from the circumstance of the counsel standing there to plead in the causes before the court that those lawyers who have been called to the bar, or admitted to plead, are termed *barristers*, and that the body collectively is denominated *the bar*; but these terms are more probably to be traced to the arrangements in the Inns of Court. [See **BARRISTER**, **INNS OF COURT**.] Prisoners are also placed for trial at the same place; and hence the practice arose of addressing them as the "prisoners at the bar." The term is similarly applied in the houses of parliament to the breast-high partition which divides from the body of the respective houses a space near the door, beyond which none but the members and clerks are admitted. To these bars witnesses and persons who have been ordered into custody for breaches of privilege are brought; and counsel stand there when admitted to plead before the respective houses. The Commons go to the bar of the House of Lords to hear the king's speech at the opening and close of the session. A trial at bar is one which takes place before all the judges at the bar of the court in which the action is brought.

BAR, in heraldry, a figure formed of two horizontal lines, which pass across and occupy a fifth part of the shield. In the language of heralds, it is one of the ten "honourable ordinaries." Half a bar is called a *closet*, and half a closet is named a *barrulet*. A double bar is known as a *bar-gemell*.

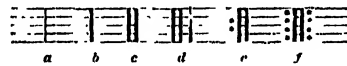
The bar-sinister, or bastard bar, is a diagonal line placed over the paternal coat of the bastard or his descendants, whether used singly or in a quartered shield.

BAR, in music, is a vertical line drawn across the staff, or the whole score of staves, so as to cut off a portion. The portions or *measures* so cut off are of equal length, and the first note in each measure bears a principal accent, by the periodical recurrence of which accents at the beginning of each bar musical rhythm is obtained. Measures, the portions cut off by bars, are now nearly always also called by the name *bars*, but the growth of this nomenclature is to be regretted as causing unnecessary confusion.

The bar in its modern meaning occurs first in Lawes' "Ayres" (published 1653), and its use became general by

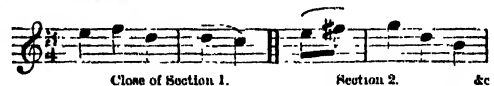
1660. (It will be remembered that Lawes was the friend of Milton.) But bars in music were used much earlier for another purpose than to indicate the recurrence of principal accents, and thereby the indication of time and rhythm; the humble purpose, namely, of keeping the notes on the different staves well in line, so that simultaneous notes should be kept vertically level with each other in the several parts. Bars of this sort are found throughout Morley's "Practical Music" (1597), and even in the early "Musica Instrumentalis" by Agricola (1529); but all the great Elizabethan works of Gibbons, Tallis, Byrd, &c., are not barred. These early bars, when they occur, are used quite irregularly, probably about as frequently as by practice was found necessary to keep the parts from straggling away from each other, and thus making the score unreadable.

Even as early as Ravenscroft's Psalter the bar was used for a third purpose, namely, to mark a musical pause similar to the end of a verse (or line) in poetry; likewise, says an old treatise, "to give time for the choir to draw breath." This bar was drawn heavily, and was called the *great bar*, to distinguish it from the ordinary or *lesser bar* when the latter came into use. The great bar was generally doubled, because in old music strains were generally repeated, so we get the *double bar*; but we sometimes find a strain repeated thrice, as in some dances, &c.; and in this case in old music a *triple bar* is found. The double bar being, as said, so very usual, came at last to mean a great bar, whether or not the part was to be repeated; so that the now familiar repeat-dots had to be added when the ancient meaning of repetition was to be conveyed.



In the example, *a* is an ordinary bar; *b* is a great bar (obsolete), marking the close of a period or phrase; *c* is a double bar, anciently meaning that the phrase it closed was to be doubled or repeated; *d* is a triple bar, indicating a threefold repetition, and now obsolete for some centuries; *e* gradually replaced *b* as merely showing the close of a phrase, and lost its own original meaning as indicating repetition, to regain which the form *c* has been introduced; *f* is the double repeat, used when both the strain before and that after the double bar are to be repeated.

By what has been said it is sufficiently manifest that double bars occur at any part of the measure. If a section of a tune ends on the second beat of a bar (measure), and the next section consequently begins on the third beat, the double bar marking the division is drawn between the second and third beats thus:—



If the section ends with the bar, the double bar is drawn instead of the ordinary bar-line.

BAR, a town in the province of Bahar in Hindustan, is on the south bank of the Ganges, situated in 25° 30' N. lat., and 86° 30' E. lon. The houses in Bar are estimated to amount to 5000; they are ill built, and the whole town presents a very mean appearance, but it is a place of considerable trade.

BA'RA BANKI, a district in Oudh, British India, under the lieutenant-governor of the North-western Provinces, lies between 26° 31' and 27° 21' N. lat., and between 80° 58' and 81° 54' E. lon. The area is 1769 square miles, and the population 1,150,000. The most easterly of the three districts which make up the Lucknow Division, Bara Banki is bounded on the north and west by Sitapur and Lucknow, on the south by Rae Bareilly and Sultanpur, on the east by Fyzabad, and on the north-east

by the broad streams of the Chanka and Gogra (Ghagra), which separate it from Bahraich and Gonda.

Like the rest of the Oudh portion of the Ganges basin, Bura Bunki consists of an almost level plain, falling gradually from north-west to south-east towards the Bay of Bengal. The district stretches for 48 miles along the right bank of the Gogra river, and spreads inland for about 80 miles over the water-parting which divides the immediate basin of the Gogra from that of its affluent, the Gunti; it then slopes down the water-shed, and into the Gunti valley.

About three-fifths of the soil are cultivated. The staple crops are wheat and rice, occupying nearly half the cultivated area. A fifth is sown with barley and gram (*Cicer arietinum*); about 20,000 acres are under sugar-cane. The principal remaining crops are maize, millets, field-pease, and arhar (*Cytisus cajanus*). The imports are piece goods from Cawnpore, salt from Agra and Delhi, coarse red cloth (khanna) and coloured stuffs from Kalpi; turmeric, pepper, and spices from Gorakhpur and Nepal. The chief exports are wheat, sugar, and country-made cloth. There is an extensive through traffic by road, rail, and river. *Sal* logs from the forests of Oudh and Nepal are floated down the Gandak to Bahraich, to be carted thence to Lucknow and Cawnpore. Rice, maize, and oil-seeds come over the Gogra from Bahraich, and are shipped from Purina Ghat to Lower Bengal in country boats, or despatched by road to Cawnpore. The manufactures of the district are plain and coloured cloth, of coarse quality, from homespun and imported yarn, the extraction of sugar and treacle from the cane, and brass and iron vessels for domestic use.

The year is divided into three seasons—the hot weather, from the end of March to the middle of June; then the rains, till the end of September or beginning of October; and the cold weather, till March comes round again. The prevailing diseases are epidemic cholera, generally introduced by pilgrims, small-pox, and malarial fevers of a mild, intermittent, quotidian type. Cases of tertian and remittent fevers are rare.

BARAGUAY D'HILLIERS, LOUIS, a distinguished French general of the first empire, was born at Paris, on 13th August, 1764. He was lieutenant in the regiment of Alsace at the outbreak of the Revolution, and after serving under Custine and Menon, he received an appointment in the army of Italy from Napoleon. He was appointed commandant of Venice in 1797, and subsequently served with distinction in the campaign in Egypt, and with the armies of the Rhine, the Tyrol, and in Catalonia. He was in command of a division in the Russian campaign of 1812, but had the misfortune to be taken prisoner with the greater part of his troops by the enemy. He was suspended from his functions by Napoleon, who ordered an inquiry into his conduct. Weakened with the hardships of the retreat, D'Hilliers was unable to sustain the mortification of having his bravery called in doubt, and was seized with an illness at Berlin, whither he had been sent as governor, and died December, 1812.

BARAGUAY D'HILLIERS, ACHILLE, son of the above, was born in Paris on the 6th September, 1795. He entered the army at a very early age, and rose rapidly through all the subordinate grades to that of lieutenant-general, which he attained on the 6th of August, 1843, and in 1847 was made inspector-general of infantry. After the Revolution of 1848 he was chosen a member of the National Assembly. In November, 1849, he went to Rome in command of the French army sent to maintain the authority of the pope. He adhered to Napoleon III., and was connected with the *coup d'état* of December, 1851. He served with distinction in the Russian war of 1854, and at the head of the French expeditionary corps of the Baltic assisted in the capture of Bomarsund. He was made a marshal of France, and

commanded in the war with Austria in 1859. At the close of the Franco-Prussian war of 1870 he was appointed president of the court appointed to inquire into the causes of the disgraceful capitulations, particularly that of Bazaine at Metz. He also presided at the special council of war which tried General Crémier in 1872. He died on the 7th of June, 1878.

BARAN'YA, a province of Hungary, is bounded S. by the Drave, E. by the Danube, N. and W. by the circles of Sonogy and Tolna. It contains 1934 square miles, and presents an agreeable alternation of hills and valleys in the northern and midland districts. There is a range of heights also in the east of Baranya, the slopes of which are covered with vineyards. The plains below them, as well as those about Mohacz, are among the most extensive levels in Hungary. The south-easternmost part of Baranya is covered with morasses. Besides the Danube and the Drave there are no important rivers in the district. The natural fertility of Baranya renders it one of the most productive regions in Hungary. It grows excellent wheat, and most other kinds of grain, fruits, and tobacco. It produces a considerable quantity of red and white wines, which are much prized. There is a great breadth of meadow, pasture, and wood lands. Sweet chestnuts are abundant, and asparagus grows in a wild state. The extensive forests afford immense crops of acorns, on which thousands of swine are fed; horned cattle and sheep are numerous; the horses are small but mettlesome. The mineral productions of Baranya consist of limestone, marble, porphyry, mill-stone grit, slate, alum, and coals. The population is 295,000; of these about eight-tenths are Catholics, and the remainder Protestants, Jews, or Greeks. The chief town is PÉNFÉNYHÁZ.

BAR'AS KHOTUN' or **BARS KHOTAN** (the "City of the Tigers"), formerly a large town on the Kherlon. The ruins of the town lie, according to Father Gerbillon, the only European who ever visited them, in 48° N. lat., and 113° 42' E. lon. When this traveller passed the river near these ruins, they consisted of extensive remains of mud walls, and two pyramids in a state of decay. After the Moguls had been defeated and expelled from China, Toghon Timur, the Mogul emperor, built this town as the future seat of the empire, and he died there in 1370. At that time it was an extensive place, nearly 7 miles in circumference. Nothing certain is known respecting its destruction. Timur's son transferred the seat of the empire to the ancient town of Karakorum, further to the west; and this circumstance was probably the chief cause of the abandonment and final destruction of the former capital.

BARB, the name of a noble breed of horses, reared by the Moors of Barbary and Morocco, and introduced into Spain by the Arabs of Northern Africa during the time in which they held dominion in that country—where, however, it has been allowed to degenerate greatly since their expulsion. It is only to a noble race of Northern Africa that the term Barb is applicable, for the common breed of that country is very inferior and much neglected. A peculiar breed of noble Barbs, called *Sh'rubak Er'reek*—that is, windsucker—is found in the desert of Sahara, beyond the limits of which, from change of food and climate, it soon declines. It is chiefly, if not exclusively, fed on camel's milk, and on a feed of this once a day the horse will travel almost incredible distances across the parched desert. It is principally employed in hunting the antelope and the ostrich. The Barb, though he has not the form which would please a member of the jockey club, possesses wonderful speed, courage, and power of endurance. The training for the saddle begins at the age of two years. They have then the mane and tail cropped, under the idea of adding by this means to their strength; but when they have attained the age of six, the mane and tail are allowed to grow, and after this period they are never dressed nor combed;

if dirty, they are simply washed in the next stream. Walking and galloping are the only paces they are allowed to practise; it is considered vulgar to trot or canter. The training of the horses for military service is very severe; and although on ordinary occasions the Moors avoid overheating their horses, they often keep them up for hours to the top of their speed, without a moment's intermission. The great exercise of the Moorish cavalry consists in galloping their horses for the distance of about a quarter of a mile, and then, while in full career, making them stop suddenly short, while the rider delivers his spear or fires his musket, and this is repeated till man and horse are both fatigued. Little attention, however, is afterwards paid to the horses; yet they are long-lived and remarkably free from disease. The Moors never make hay, but feed their horses upon chopped straw and barley, which the horses eat out of a nose-bag. In spring they are fed upon grass. There are no mangers in the stables, and the horses are tethered to iron pins driven into the ground. Mr. Youatt thus describes the characters of a true Barb from Morocco, Fez, and the interior of Tripoli:—"Fore-hand long and slender; ill furnished with a mane, but rising distinctly and boldly out of the withers—head small and lean—ears well formed and well placed—shoulders light, sloping backward and flat—withers fine and high—joins straight and short—flanks and ribs round and full, and with not too much band—lumbar strong—croup perhaps a little too long—quarters unsecular and well developed—legs clean, with the tendons boldly detached from the bone—pastern somewhat too long and oblique—foot sound and good. They are rather lower than the Arabian, seldom exceeding 14 hands and an inch, and have not his spirit, speed, or continuance, although in general form they are probably his superior." The first Barb imported into England of which there is any mention in the Stud Book was a mare, the property of Charles II. The famous Godolphin Arabian was a pure Barb, foaled in Barbary and imported into England during the reign of George II. He was a brown bay about 15 hands high. He shares with the Darley Arabian and the Byerly Turk the honour of being the progenitor of our English race-horses. See HOUSE.

BARBADOES is the most eastern of the Caribbee Islands, and the most ancient of the British settlements in the West Indies. Unlike most of the West India Islands it has never changed owners. The exact date of its discovery is unknown, but no mention of it occurs prior to 1600. In all probability it was first seen by the Portuguese in their voyages to and from South America, from whom it derived its name, which it is supposed to have obtained from the Indian fig-trees growing on the island, and which were called by them "barbadas," or bearded.

The first English ship known to have touched at the island was the *Olive*, in 1605, on her return from Guinea; part of the crew landed, erected a cross, and took possession in the name of the king, inscribing on a tree, "James, king of England and of this Island." Nearly twenty years afterwards, Sir William Courteen, a merchant of London, sent out a colonizing expedition; thirty men landed, in 1624, on the spot which had been taken possession of by the *Olive*, and laid the foundation of a town, which, in honour of the reigning king, they called James Town. During the next twenty years there were continual disputes between various English noblemen, who sought to outvie each other in obtaining a royal grant of the island; and rival parties of colonists frequently came into collision. But by the year 1645 matters became more settled. The civil war and religious dissensions which were raging in England contributed greatly to the rapid population of the island, and many Royalist families found an asylum in it. The leeward part seems to have been first and best settled. Many of the planters had become rich, and arrangements had been made for a local government of the island. The

population had in 1647 increased to 50,000, and the value of land had, of course, risen in proportion. An unrestricted intercourse existed with the Dutch very favourable to the Barbadians, but money was so scarce that barter of commodities was often necessarily resorted to, and all fees and emoluments were paid in kind.

When and whence the sugar-cane was first imported is uncertain, but in 1647 Ligon speaks of the art of making sugar as a business recently begun and little understood; and it is to the Dutch that we are indebted for the first instruction in the culture of the plant, and the manufacture of this valuable product.

During the civil war the rival claimants to the ownership of Barbadoes carried their partisanship into that island, and the colonists were involved in turbulent proceedings until the Restoration. Then succeeded legal contests, in which the Earl of Carlisle and Lord Willoughby contended for the island, while the colonists wished to shake them both off. The latter were finally freed from these seigniorial claims by an arrangement made in 1663; and six years afterwards Barbadoes was made the headquarters of a more extensive government, called the Windward Islands, which was defined to include all the islands to windward of Guadalupe; that and the other islands of the Caribbean chain having been formed into a distinct command under the title of the Leeward Islands.

In August, 1675, Barbadoes was visited with a most awful hurricane. Neither tree nor house was left standing, except a few sheltered by some hill or cliff, and the whole face of the country exhibited one scene of desolation; while the coast was strewn with wrecks, and many lives were lost at sea and on shore. This was followed by other events, physical and commercial, such as a pestilence, a revolt of the negro-slaves, the imposition of a tax upon sugar, &c., which greatly retarded the progress of the colony.

In the first half of the eighteenth century many salutary laws were made for the good government of the colony; but the House of Assembly were frequently at issue with the executive and ecclesiastical powers in the mother country, respecting questions bearing on the interests of the colony. In the latter half of the century the Seven Years' War, the American War, and the French Revolutionary War, involved Barbadoes more or less in their consequences; and these, together with mismanagement in the colonial office, and frequent fires and hurricanes in the island, brought the colonists to a very impoverished state by the end of the century. In 1831 the island was visited by a hurricane, more dreadful than had ever before been experienced, by which 5000 persons lost their lives and an immense amount of property was destroyed. A confederation of the Leeward Islands was formed in 1871, and the greater efficiency of government and saving of expense with which it was attended induced the colonial office to suggest a similar confederation of the Windward Islands, with Barbadoes at its head. The majority of the inhabitants appeared to be in favour of the proposal, but it was opposed by the legislature, and in 1876 this gave rise to some serious riots, which for a time considerably impeded the prosperity of the island; but changes were made in the administration, and confidence was soon re-established.

The constituent parts of the legislative body of Barbadoes are, first, the governor, who is appointed by and represents the crown (and who is also governor-in-chief of St. Vincent, Tobago, Grenada, and St. Lucia); second, the council, appointed by the sovereign; and third, the assembly, which consists of representatives of the people. The governor has an authority over the civil, judicial, and military institutions of the colony, somewhat resembling that of the sovereign, and, like the sovereign, has a veto on any law passed by the assembly. The second constituent part of the legislative body, the council, stand somewhat in the same rank in the colonies as the peerage in England. With

them may originate any bill unconnected with levies or the disposal of public money. The third body, the assembly, is entirely composed of the representatives of the people, annually elected, two members being sent by each parish. Barbadoes is the seat of a bishopric, and seven-eighths of the population are members of the Church of England. The capital possesses a college and several other fine buildings.

Barbadoes is quite detached from the Caribbean chain, being 80 miles to the eastward of St. Vincent, the nearest island. It lies N.W. and S.E., and has nearly the same size and proportions as the Isle of Wight, being 21 miles in length and 14 miles across in its broadest part. The surface is comparatively low, with gently-undulating hills. The climate, though warm, is as healthy as any part of the West Indies, and the heat is greatly alleviated by the trade-wind, which constantly blows over the island; indeed, the longevity of its inhabitants is a proof of its salubrity. But the awful hurricanes with which it has from time to time been visited render the value of property very uncertain. There are several bituminous springs, some of which furnish a green tar that often supplies the want of pitch and lamp-oil.

The total area of Barbadoes is 106,470 acres, nearly all of which are under cultivation; the soil in the lowlands is black, and somewhat reddish in the parts where it is shallow, on the hills chalky, marly, and near the sea-shore sandy. The black mould is suited to the sugar-cane, which is as productive here as in any island of the West Indies; the land is kept in a high state of cultivation, but requires much manuring. The island is generally well supplied with water, but fire-wood is expensive. Stock, vegetables, and fruit are plentiful. The island, generally, has the appearance of a well-kept garden, intersected throughout by excellent roads. Scarcely an acre on which anything could be grown remains unproductive, and as there is thus no room for squatting, the population have been compelled to labour diligently for hire, and are generally in a condition most creditable to their industry and prudence.

The principal, and indeed almost the only anchorage, is in Carlisle Bay, off Bridgetown, the capital of the island, where the merchant vessels load and discharge their cargoes, the sugar being brought from the other parts of the island in small vessels called *droghers*. Carlisle Bay is quite open to the westward, but sheltered by a projecting tongue of land, called Needham's Point, from the trade-wind and the Atlantic swell; and except in case of a hurricane may be considered a secure port. There is a small bay also off Oistins, where vessels occasionally anchor, as they do off Speight's Town; but the island is nearly encircled by coral reefs, and the navigation in its neighbourhood is consequently very dangerous.

The population in 1881 was 174,889, of whom 17,000 were white, and the remainder coloured and black. As the area of the island is only 166 square miles, it will be seen that the density of the population is considerably more than 1800 per square mile! The revenue and expenditure is each about £130,000 per annum. The imports and exports are each valued at £1,200,000 per annum. There is a large foreign commerce at Barbadoes, arising from its favourable position as an entrepôt. The principal articles imported are manure, provisions—large quantities of which are obtained from the United States—linen and cotton goods, and hardware, the bulk of which is supplied by Great Britain. The quantity of sugar annually exported is over 50,000 hogsheads; value, £800,000. The other articles exported are chiefly molasses and rum. The imports and exports have varied much at different periods, in consequence of hurricanes and bad harvests.

BARBARA, ST., who suffered martyrdom at Nicomedia, in Bithynia, about A.D. 236—or, according to other accounts, at Heliopolis, in 306—was born of good family, and was well educated by her father, Dioscorus.

In order that she might give undisturbed attention to her studies he had a bower built for her, where she spent her time in retirement. She embraced Christianity through the influence of Origen, and her heathen father was so enraged that he handed her over to the Roman governor, Martianns, to be dealt with according to law. The governor, having tried in vain to shake her constancy by arguments and threats, had recourse to torture, but found that equally unavailing. Unmoved by her constancy under suffering, her father at length offered to strike off her head. His offer was accepted, but he had scarcely performed the deed of blood when he was blasted by a flash of lightning. Hence St. Barbara is prayed to during storms, and is the patron saint of artillery, her image in former times being placed on arsenals, powder magazines, &c. The magazine in a French ship of war is still called St. Barbe. Her day in the Roman Catholic calendar is on the 4th of December.

BARBARÆA (from a former name, Herb St. Barbara), a genus of plants belonging to the order CRUCIFERÆ. The species of Barbarea are perennial herbs, with fibrous roots and erect stems. The flowers are yellow, arranged in racemes; the pedicels without bracts. *Barbarea vulgaris* (common winter cress) is a native, in damp moist places, of Great Britain and throughout Europe; also of North America. This plant has a bitter nauseous taste, and is sometimes grown as a spring salad. It is often cultivated in gardens, especially a double variety which forms a handsome border-plant, the yellow Rocket Herb. *Barbarea præcor* (early winter cress) is a native of France and Great Britain; it is abundant in North America. It may be used as a salad, but is more bitter than the common water-cress (*Nasturtium officinale*).

BARBARIAN. The Greek term *barbaros* appears originally to have been applied to signify a mode of speech which was unintelligible to the Greeks; and it was perhaps an imitative word intended to represent a confused and indistinct sound. When all the races and states of Greek origin obtained a common name, the word acquired a general negative sense, and expressed all persons who were not Greeks (Thucydides, i. 3); and subsequently it denoted a lower state of civilization compared with the higher standard of the Greeks. In Roman times *barbari* signified all who were not Romans or Greeks. After the fall of the Western empire the term was applied to the Teutonic races who overran western Europe, who did not consider it a term of reproach, since they used it in their own codes of law as an appellation of the Germans, as opposed to the Romans. *Barbarian*, in modern languages, generally means a person in a low state of civilization.

BARBAROSSA, FREDERICK, Emperor of Germany (Frederick I.), so called from the ruddy colour of his beard, was born in 1121, and succeeded his uncle Conrad III. on the imperial throne in 1152. Conrad, knowing that many important and difficult affairs both in church and state demanded immediate attention, and that a man of no common energy was required to accomplish such a task, did not recommend to the princes of the empire his young son Frederick, but his nephew Frederick, son of Frederick, duke of Swabia, by Judith, daughter of Henry, duke of Bavaria. Accordingly, on the seventeenth day after the death of Conrad, Frederick was unanimously chosen and crowned at Aix-la-Chapelle. He nobly vindicated his uncle's choice, for he may safely be pronounced the greatest of all the German emperors. Settling the competition between Canute and Sweegen for the Danish crown in favour of the latter, he went to Italy in 1155 to receive homage and to punish the Milanese and others who had offended him. In this his first expedition into Italy, he in some measure humbled the Milanese, inflicted severe chastisement on Asti, took Tortona, which he left to utter destruction after the inhabitants had retired, was

crowned king of Italy at Pavia, and advanced rapidly towards Rome, where Adrian IV. had just succeeded Pope Anastasius. The city had been excited by Arnold of Brescia to dispute the authority of the pope. (Arnold was subsequently taken prisoner, and burned alive by the pope. See ARNOLD OF BRESCIA.) Having had an interview with the pope, at which he consented to hold his Holiness' stirrup, and having re-established his authority at Rome and received the imperial crown from his hands, Barbarossa set out on his return to Germany. He divorced his first wife on the plea of consanguinity, and married (in 1156) Beatrice, heiress of Burgundy, which thus passed to him. Barbarossa compelled Boleslaus, duke of Poland, to acknowledge himself a vassal of the empire, and in the first six years of his reign restored the empire to the same power and extent of dominion which it had under Henry III. He took a terrible vengeance on the Milanese for their oppressive conduct to the towns that would not submit to them; so angry was he that he made Gebhardus, the governor of Milan, lie chained under his table like a dog for three days, a terror to evil-doers. He besieged Milan in 1158 with 115,000 troops, subdued it, and on its again rebelling destroyed its fortifications and entirely broke its spirit and power by his severity.

On the death of Pope Adrian some of the cardinals chose Victor IV., who was inclined to the imperial interests, and the others Alexander III. Frederick, who considered himself as protector of the church, called a council at Pavia, which pronounced for Victor IV. Alexander excommunicated the emperor and all his partisans, and was himself recognized by the Kings of France and England, and the estates of Lombardy. The emperor, with Louis VII., king of France, with whom Pope Alexander had sought refuge, agreed that a council should be held to terminate the schism in the church, by deciding between the two popes; this plan, however, failed. On the death of Pope Victor IV. in 1164, the choice of the emperor's party fell on Paschal III., who was solemnly installed, and who then crowned the emperor and his consort Beatrice. Barbarossa was vanquished by pestilence in a third campaign in Italy in 1168, and it was with no little difficulty that he returned. During the next six years he was busily engaged settling the affairs of Germany and putting down the feuds of the princes, &c. He also defeated a powerful confederacy against him, and soon afterwards married Matilda, daughter of Henry II., king of England. In 1169 Barbarossa prevailed on the princes of the empire to choose his son Henry, who was only five years old, king of the Romans, and he was accordingly crowned at Aix-la-Chapelle. Having appeased the disorders in Saxony, and undertaken a successful expedition against Boleslaus, duke of Poland, he prepared for a fourth time to cross the Alps. Pope Paschal had died, and the cardinals in the interest of the emperor chose for his successor Calixtus III., a man very inferior in talent to Alexander. The latter was now rapidly gaining ground. The cities of Lombardy built a new city, which was called Alexandria in honour of him. Only Genoa and Pisa remained true to the emperor. Having in vain sent the Archbishop of Mentz, with a small army, to conclude peace, he himself followed besieged Alexandria, negotiated, sent part of his army back, and at last had to fight; when the Lombards defeated him, and it was thought had killed him. A few days afterwards, however, to the unspeakable joy of the army, he appeared again at Pavia, where the empress had already put on mourning.

He now gave up Calixtus (who was dismissed from his popedom with a rich abbey), was relieved by Alexander from the excommunication, and made peace with the Lombards for six years, which afterwards, by the treaty of Constance, assumed a more permanent character. Soon after he had himself and consort crowned at Arles, a

king and queen of Burgundy. The peace of the empire now appeared established, when new troubles arose in Saxony. Henry the Lion, its duke, had formed great plans to extend his power, but was in the end forced to sue for peace, and was banished for three years. Henry accordingly went, with his wife and children, to his father-in-law the King of England.

A year after the peace of Constance, order and tranquillity everywhere prevailing, the emperor called a general diet at Mentz, one object of which was to establish his five sons. This diet presented a scene of unrivalled festivity and splendour, lasting for three weeks—the grandest tourney ever seen. The people had some reason to share in this general congratulation. In Germany Frederick had declared Lübeck and Ratisbon imperial cities, and thereby had laid the foundation of a middle estate between the princes and the emperor, by which the power of the latter was increased, and the class of citizens elevated. Barbarossa's brilliant and varied life needed but one additional illustration, his devotion to religion. On the breaking out of the third crusade, the emperor, now an old man of seventy, in great grief at the taking of Jerusalem by Saladin, took the cross in 1189, with his son Frederick and a number of the principal German nobles, and an army of 150,000 men, besides many thousand volunteers. He penetrated into Asia, gained two victories over the Turks near Iconium, and was proceeding in his victorious career to Syria, when his eventful life was brought to a close in an attempt to swim on horseback across the river Calycadnus, where he was carried away by the current. After his death his son Frederick, duke of Swabia, took the chief command, but died of a pestilential disorder at the siege of Acre in 1191; and of the mighty army led from Germany only a small remnant returned. Barbarossa was the darling of his people; it is no fiction to say that his very footsteps were worshipped. In those ages of oppression a man, and he the greatest on earth, who ever succoured the oppressed and put down the oppressor with a strong hand was like enough to be loved extravagantly. Besides he had already once reappeared, after a presumed death, at Pavia. What wonder, then, if he who seemed to be more than human, and to bear a charmed life, should be thought to live still? "He sits within the hill near Salzburg yonder, says tradition, its fancy kindled by strange noises from hidden waters within that limestone hill, and by the grand rocky look of the place. A peasant once, stumbling into the interior, saw the Kaiser in his stone cavern; Kaiser sat at a marble table leaning on his elbow, winking, only half asleep; beard had grown through the table and streamed out on the floor; he looked at the peasant one moment, asked him something about the time it was, then drooped his eyelids again: Not yet time, but will be soon. He is winking as if to awake. To awake and set his shield aloft again, with—Ho! every one that is suffering wrong!" (Carlyle, "Frederick the Great," book ii.)

BARBAROSSA, HARUDJ, was born in the island of Mytilene about the year 1474, of Christian parents, and when twenty years of age went on board a Turkish privateer, embracing at the same time the Mohammedan faith. When he assumed the Turkish name of Harudj. Having served for several years, during which he distinguished himself by his bravery and intelligence, he was appointed commander of a galliot. His first success was off the island of Elba, where he took two large Papal galleys richly laden, and bound from Genoa to Civita Vecchia, and afterwards he took many others. The fort of Goletta was his headquarters; there he disposed of his prizes, paying a tithe to the Bey of Tanis, and in the course of a few years he grew enormously rich. The Christian sailors, whose terror he had become, gave him the name of Barbarossa, from the colour of his beard, which was red. In 1516 he obtained

possession of Algiers, and this was the beginning of the Turkish dominion over Algiers.

The Spaniards of Oran, alarmed at the rapid success of such an enterprising chief, demanded reinforcements from Spain; and Charles V., in 1518, sent 10,000 men under the Marquis de Comares, with orders to drive Harudj out of Algiers. In the battle that took place Harudj lost his life, at the age of forty-four, but the Spaniards were repulsed.

BARBAROSSA, KHAIR EDDIN', brother of Harudj. His name was Hadhir, but in the course of his successful career he was honoured by Sultan Solymán with the title of Khair Eddin, i.e. "the good of the faith." He is also styled by historians Barbarossa II., having succeeded his brother in the sovereignty of Algiers, and being known at sea by the same formidable name. In the following year, after the death of Harudj (1519), a new armament from Spain appeared before Algiers, which met with the same fate as the former; but more effectually to secure himself, Barbarossa agreed to become the tributary of the sultan, Selim I., and from that time Algiers became subject to the high dominion of the Porte. Barbarossa continued to strengthen himself in Algiers, and in 1532 took possession of Tunis, in the name of Solymán, sultan of the Turks, who in return made him capitan-pasha of the Turkish fleet, in which capacity he displayed great bravery and skill in opposing the combined fleets of Spain, Venice, and Genoa, the last of which was commanded by the celebrated Doria; and he ravaged the coasts of Italy and the Grecian islands held by the Venetians repeatedly and fearfully. At length, on the alliance of the Turks with Francis I. against Charles V., the French and Turkish squadrons were united under Barbarossa, and they sailed together out of Marseilles on the 5th of August, 1543, to attack the town of Nice, which belonged to the Duke of Savoy. People saw with astonishment the Ottoman crescent and the lilies of France combined against a Christian city, on whose ramparts floated the white cross of Savoy. Nice was obliged to surrender by capitulation, but the castle continued to defend itself until the report of Doria's approach induced Barbarossa to raise the siege. He, however, plundered the town in the night, against the articles of the capitulation, burned part of it, and carried off 5000 of the inhabitants. Barbarossa returned to Constantinople in 1544; and he does not seem to have gone to sea any more afterwards. He died in 1546, and was buried at Beshiktash, near the entrance of the Black Sea, where he had a country house, and the place where he was buried was to be seen not many years since.

BARBAROUX, CHARLES, one of the purest and noblest of the principal actors in the French Revolution, was born at Marseilles in 1767, and in February, 1792, came to Paris to represent his native town in the Legislative Assembly (the creation and outcome of the famous Constituent Assembly), being then advocate and town-clerk of Marseilles. He fell in with the Rolands in Paris, became intimate with them, and so joined what was afterwards the Girondist or moderate republican party. Madame Roland has left a brilliant sketch of the talented enthusiastic young advocate, "beautiful as Antinous." When Austria and Prussia, with almost all the rest of Europe understood to be secretly backing them, declared a defensive alliance against distracted France, soon after Barbaroux's arrival at Paris, and when it was found (as was but natural) that the king and court were only too desirous to help their country's enemies and their own friends, it was Barbaroux who, dashing away his angry tears, sent the fire-message to his native town—"Send me 600 men who know how to die;" and produced the famous march to Paris of the Marseillaise, and indirectly the immortal hymn of revolution with which they nerved themselves to every fatigue. The scenes of excitement occurring on their entry into Paris, coeval with the long-expected declaration of war by Prussia, and

immediately followed by the riot of 10th August and massacre of the Swiss Guards, resulting in the summoning of the evilly-famous Convention, are described, as it were, in flashes of lightning in one of the most marvellous histories ever written, and need not be further alluded to here (Carlyle's "French Revolution," books v. and vi.) In these scenes Barbaroux bore a consistent and truly patriotic part, and was returned to the new assembly, the National Convention, as citizen-representative for Marseilles, with the greatest enthusiasm. In the Convention, which at once decreed the republic, Barbaroux was very soon bold enough to denounce and expose Robespierre openly, and to sign his name to written charges against him, of connivance with those dreadful September massacres of prisoners which signalized their meeting, of secret plots against liberty, and of other crimes. Had he only been supported by his friends! The moment was allowed to slip, and when Louvet repeated the charges, now formalized into an accusation against Robespierre of aiming at a dictatorship, Barbaroux was refused a hearing in the debate which followed, though he pleaded passionately to be heard, even leaving his place as deputy, and appealing at the bar as a common petitioner. The "Mountain" had not been idle in the interim. If we add to this the fact that at the trial of the king in December of the same year (1792) Barbaroux voted for an appeal to the people instead of an immediate sentence, we cannot wonder that he was the object of especial hatred to the "Mountain," and a cause of fury to its leader, Robespierre. When it came to the struggle on Sunday, the 2nd of June, 1793, and the "twenty-two" Girondists were offered their freedom if they would voluntarily quit the Convention, now altogether under the control of Robespierre, it was Barbaroux who exclaimed—"No! I have sworn to die at my post, and will keep my oath;" whereat the public in the galleries rose in execration, brandishing weapons, and Henriot with the troops advanced to surround the Tuileries, lest any of the doomed men should escape. Thirty-two representatives (the "twenty-two" having grown in numbers) were expelled at once, sent to their homes, and guarded by gendarmes. Several, and amongst them Barbaroux, escaped and took refuge in the provinces; but here he could not, "proserit" though he was, keep quiet, and see France perish; for it was he who gave Charlotte Corday the note of introduction to Duperret, which formed her ostensible pretext for going to Paris on her actual errand to murder Marat. In July, eleven of the chief of the Girondists made a brave attempt to rouse southern France against the Terror; it failed, and they fled towards Bordeaux, intending there to take ship for some less distracted country. The vivid account of this flight of the eleven Girondists by Louvet is too famous to need more than mention here. Barbaroux, with sprained ankle, ever cheery, is seen in it limping along, full of hope and valour. He and one or two others took ship from Quimper in a fishing boat, still struggling towards Bordeaux, and reached there in August, finding some holes, or cellars, or lofts in which to be hidden by friends. The pursuit waxing hotter, an affecting farewell was taken, and the fugitives separated. One July morning in 1794, when changing their hiding-place, Barbaroux, Buzot, and Pétion (who had kept together) were surprised by a crowd of country people whom they mistook for pursuers; and Barbaroux, resolved not to fall into their hands alive, shot himself. He was but twenty-seven years old even then. The other two, thus deprived of their heart and head, were found in a corn-field two days after, their bodies half eaten by dogs.

BAR'BARÝ, a general and rather vague denomination which has been adopted by Europeans to designate the northern part of Africa, which extends along the coast of the Mediterranean and as far inland as the great desert, from the frontiers of Egypt to the Atlantic Ocean. It

embraces four states or divisions—ALGERIA, MOROCCO, TUNIS, and TRIPOLI, with their respective dependencies. The appellation of Barbary appears to have been derived from Berber, by which the Arabs designated the people who inhabited this region before the Saracen conquest. Such at least seems to be the derivation assumed by the Arabian historians and geographers, who use the word Barbary or Berbery in speaking of North Africa. Others derive Barbary from *barbarus*, "barbarian." The natural, geographical, historical, and political features of this wide region are treated under the articles referred to above.

The region is called by the Arabs of Egypt and of Asia, Moghreb, or "the West," and the people Moghrebins. The language of the Moors is called the Western Arabic, and differs from the Arabic of Egypt and Syria. Some of the Arab tribes of the interior, however, have retained their original language, the Korish or Eastern Arabic. The principal races that inhabit Barbary are:—1. The Moors, who live in or near the towns, and who are a very mixed race: many of them are descended from those who were driven out of Spain in the fifteenth and sixteenth centuries. 2. The Arabs, who are mostly nomadic, and tend their flocks on the plains of the interior. 3. The Berbers, or Kahlyles as they are called in Algeria and Tunis, who chiefly inhabit the mountains and the valleys of the Atlas. 4. The Blacks, from Soudan, who are mostly slaves. 5. The Jews, who are very numerous in the towns, where many of them carry on various branches of profitable trade. 6. The Turks, who often have children by Moorish wives, who are called Kooloolis.

The length of Barbary from E. to W. may be reckoned about 2000 miles, from Bomba, the eastern frontier town of Tripoli, to the coast of Mogadore, in Morocco. The breadth of the country varies greatly.

BAR'BARY APE or **MAGOT** (*Macacus* or *Inuus sylvanus*) is a small catarrhine ape, a native of Northern Africa and Gibraltar. It is the only monkey found in Europe. The claims of the Barbary ape on all who have profited by medical science are very great, for it was dissected and its anatomy studied by Galen, a physician of the second century. This ape, it is said, played the part of the Capitoline goose in the siege of Gibraltar, giving the alarm to the garrison when the Spaniards attempted a surprise.

This interesting little animal is about the size of a cat, and the general colour of the fur is yellowish-brown. The tail is quite rudimentary, having only three vertebrae. This ape usually goes on all fours. The food of the magots in their native African forests consists of figs, chestnuts, fruit, and vegetables. In Gibraltar, however, they are restricted to roots and bulbs, with such luxuries as eggs whenever they can get a chance of stealing them.

The question naturally arises, How did the Barbary ape get on the Rock of Gibraltar? How was he separated from his brethren in Algeria and Morocco? The hypothesis of the existence of a subterranean passage from the Dark Continent to the Rock is ingenious, but scarcely probable. On the other hand the strong current through the straits would effectually prevent anything drifting from one side of them to the other. The most probable explanation is that at a distant period the two continents were united, and the magot roamed at will through Algeria, Morocco, the land now covered by the sea, and the south of Spain. This hypothesis is rendered more probable by the fact that in some caves recently discovered in Gibraltar bones of the hyena, the rhinoceros, and the elephant have been found resembling the bones of the same animals now living in Africa. See **AFR.**

BARBAS'TRO, the chief town of a very fertile district of the same name, in the province of Huesca, in Aragon. It is situated on the Vero, which is crossed by stone bridges. Barbastro is the seat of a bishop, and has a population of 7000, chiefly employed in tanning and currying leather.

BAR'BAULD, MRS., was the only daughter of the Rev. John Aikin, D.D., and the sister of John Aikin, M.D. Miss Anna Lætitia Aikin was born 29th June, 1743, at the village of Kibworth Harcourt, in Leicestershire, where her father was at that time master of a boys' school. Her early education was superior to what was then considered fitting for young ladies. She had a tolerable knowledge of Latin, besides some acquaintance with Greek. Her father removed with his family to the town of Warrington when she was fifteen years of age. At Warrington the society among which she lived was such as to fix her tastes in the direction they had taken, and to enlarge the sphere of her knowledge. Miss Aikin had early shown a taste for poetry, but it was not until the year 1773, when she was thirty years of age, that she yielded to the persuasions of her brother, and consented to the publication of a selection from her poems. The success of this volume at once established her reputation.

In 1774 Miss Aikin married the Rev. Rochemont Barbauld, a Dissenting minister, descended from a family of French Protestants, who had taken refuge in England in the reign of Louis XIV. Mr. Barbauld was educated in the academy at Warrington, and at the time of his marriage had been recently appointed to the charge of a Dissenting congregation at Palgrave in Suffolk. He opened a boarding-school for boys, and his wife assisted him in the business of instruction. After a few years, Mrs. Barbauld was solicited to receive several little boys as her own peculiar pupils; and among this number may be mentioned Lord Denman, afterwards chief-justice of England, and Sir William Gell. It was for the use of these her almost infant scholars that she composed her "Hymns in Prose for Children." In 1775 Mrs. Barbauld published a small volume, entitled "Devotional Pieces," &c., and about the same time also she wrote that admirable little volume, her "Early Lessons," a publication which has ever since been a standard work.

The school at Palgrave was continued with success for eleven years; but this continued mental exertion impaired the health of its conductors. After a residence of a year or two abroad they settled at Hampstead, where Mr. Barbauld received a few pupils. Mrs. Barbauld took an active interest in the stirring politics of that time, and wrote on the subjects of the Test Acts and the slave trade. She contributed several papers to her brother's always popular "Evenings at Home."

Mr. Barbauld became, in 1802, pastor of a Unitarian congregation at Newington Green, and at this time he changed his residence to Stoke Newington. The chief inducement to this removal was the desire felt by Mrs. Barbauld and her brother to pass the remainder of their lives in each other's society. Mrs. Barbauld's husband died in 1808. She continued to employ herself in literary undertakings, and in 1811 published a political poem, which was not, however, very favourably received.

Her spirits were greatly tried during the later years of her life by the loss of her brother, who died in 1822. Her constitution, naturally excellent, slowly gave way under an asthmatic complaint, and she died on the 9th of March, 1825, after only a few days' serious illness. In domestic life Mrs. Barbauld was characterized by strong sense, deep feeling, high moral principle, and a rational but ardent piety. Her works were collected by her niece, Lucy Aikin, and published (London, 1825) in two volumes, prefaced by an interesting memoir. See also "Memoir of Mrs. Barbauld" (1874), by her great-niece, Mrs. A. L. Le Breton; and "Memoir of Mrs. A. L. Barbauld," by Grace A. Ellis (1874).

BAR'BEL (*Barbus*), a genus of fishes belonging to the carp family (Cyprinidæ) and the order **PHYSOSTOMI**. The characteristics of the genus are the following—dorsal and anal fins short, the second or third ray of the dorsal fin

in the form of a strong and formidable spire, and in most species four fleshy barbels about the mouth, namely, two on the snout, and two at the angles of the upper jaw.

The barbels are not exclusively carnivorous; they feed also on aquatic plants and roots, and bore with their snout into the soft earth of the banks in order to obtain them. The species are numerous, both in the Old and New World. Many attain to a very large size.

The common barbel (*Barbus vulgaris*) is found in most of the larger rivers of Europe. It abounds in the Thames, affording good sport to the angler; but it is worthless for the table, being coarse and bony. "During summer," says Yarrell, "this fish in shoals frequents the weedy parts of the river; but as soon as the weeds begin to decay in autumn it seeks deeper water, and shelters itself near piles, locks, and bridges, which it frequents till the following spring." It feeds on slugs, worms, and small fish, and spawns in May. The barbel grows to a large size, and weighs often from 8 to 10 lbs. Yarrell records one the weight of which was 15½ lbs.

"The barbel," says Buckland, "has not a tooth in his head; his mouth is made for poking about among the stones at the bottom of the river and procuring his prey, which consists of almost anything. He is a regular fresh-water pig, and lives by picking up what he can find, be it animal or be it vegetable; a good big lob-worm, however, he cannot resist, as I have discovered, to my great delight. When a barbel is hooked he always endeavours to strike at the line with his tail to break it. Now if we examine the back fin of the barbel we shall find that the first ray of it is cut into deep notches just like a saw, and I always fancy that the barbel in these struggles is endeavouring to use this saw-like fin. It can be of no use to him, however, as regards severing the line, for the serrations are quite covered by the membrane which envelops this first ray of the fin, in common with the other rays. The use of it I imagine to be to steady and steer him in the rapid currents and mill streams in which he lives. If we move the serrated ray upwards, we find the whole fin follows it and is kept tense by it; let it go, the fin again sinks down." In France barbels are caught with "bell rods"—fishing rods with a bell attached to a piece of whalebone at the top. The bell rings when the fish touches the bait.

A closely allied species, called the Binny (*Barbus bynni*), abounds in the Nile, where it grows to a large size, some weighing 70 lbs. It is much esteemed, and consequently captured in great numbers; but as fish, when dead, will not keep in Egypt, the fishermen, having hauled up their lines and secured the fish, put a strong iron ring through the jaw, and attaching a stout cord to the ring, return the fish to the river, and fasten the cord to the shore; consequently they have always a stock of live fish ready for sale. The bait used is a date steeped in honey, and several of these, each concealing a hook, are stuck into a mass consisting of oil, clay, flour, honey, and chopped straw; into this, when dropped into the deep water, the fish greedily bore, and arriving at the dates ravenously swallow them, and are of course caught by the hook concealed within; the cord attached to each hook is not held by the fisherman, but fastened to a palm branch stuck into the bank, with a small bell suspended to it. The fisherman sits near, pursuing some occupation, and is warned by the ringing of the bell when a fish is hooked. He ascertains to which of his lines it is attached, pulls it out, and secures it in the manner which has just been described.

BARBELS (*barba*, a beard) are skinny appendages found on the jaws of some fishes, usually four in number. They are often developed into movable and sensitive organs of touch.

BARBER (*Lat. barba*, the beard), one whose occupation it is to shave and trim beards, and who generally includes with that the cutting and dressing of hair. The

occupation is one of great antiquity, and is referred to in the Old Testament (Ezek. v. 1) as though existing among the Jews, notwithstanding the prohibitions in the law against shaving the beard and temples (Lev. xix. 27). In former times the profession was one of some dignity and importance, the barber acting also as surgeon ("barber-surgeon"); and at a later period, when it was fashionable for gentlemen to wear elaborate wigs and powder, the barber was in great request. In England and France the practice of private shaving and of letting the beard grow, and especially the abandonment of wigs, have caused the business to decline, and its followers are mostly drawn from the humbler classes. In Spain the barber is still an important personage, and his services are called into general requisition, while his shop still forms a favourite lounge, as it used to do all over Europe in the middle ages, for the purpose of smoking and gossip. In Oriental countries, where the practice of shaving the whole or part of the head is indulged in, the trade still flourishes. The peculiar practice of the Chinese causes the trade of the barber to be one of considerable importance, though it is only followed by the poorer classes. In the southern districts of China the barbers carry their stock-in-trade about with them and practise in the open air; and with the aid of a razor, which costs about twopence, a strip made of a strip of stout calico, and a little warm water, contrive (without the use of soap) to shave their customers, usually charging three cash, or about a farthing.

Anciently, the barber's razor being the great blood-letter, the barber and surgeon were regarded as having a natural affinity; and some of the minor operations of surgery, such as tooth-drawing and blood-letting, were practised by barbers down to a very recent period indeed. In England the barbers were first incorporated in 1461, during the reign of Edward IV., and by 32 Henry VIII. c. 42, they were united with the surgeons into one company of barber-surgeons. Though this Act distinguishes between the two professions, forbidding the surgeons to practice "barbery or shaving," and confining the barbers to the minor operations already referred to, the two companies remained united until 1745, when they were separated by the Act 18 George II. c. 15; but the barbers still possess the ancient hall which they had before the surgeons were disunited from them, and which stands in Monkwell Street, Cripplegate, in the city of London. The barber's sign of a striped pole refers to the practice of blood-letting, the spiral lines representing the ribbon used for winding round the arm previous to that operation. The small brass basin which hangs from the end of the pole, and in the contour of which a curved notch is seen, is the representative of the barber's basin which received alike the blood drawn from a patient or the lather wherewith to shave a customer; in the latter case the neck fitted into the curved notch, so that no lather was spilt on the clothes. The use of a barber's basin as a helmet by Don Quixote, who took it for the enchanted helmet of Mumbo, is one of the most mirth-stirring touches in that immortal book.

BARBERINI, an Italian family which was originally settled in Florence, and was raised to a high rank among the Roman nobility in consequence of the elevation of one of its members, Cardinal Maffeo Barberini, to the Papal chair in 1623, when he assumed the name of Urban VIII. Urban had three nephews, two of whom were made cardinals, and the third prefect of Rome, and they ultimately, after some vicissitudes, became possessed of the fief of Palestrina, which had formerly belonged to the Colonna family. The Barberini have ever since ranked among the first Roman nobility, several of them having been cardinals, while the lay representative of the family bears the title of prince, and is possessed of estates at Palestrina, Albano, and in other parts of Italy. In the palace of the Barberini at Palestrina is the celebrated mosaic taken

out of the Temple of Fortune of Præneste. [See PALESTRINA.] The Palazzo Barberini at Rome is a vast structure, built by Bernini, and gives its name to the square before it. It contains a museum, a gallery of paintings, and a library, which was collected by Cardinal Francis Barberini, one of the nephews of Urban VIII. The library is rich in valuable MSS.; its catalogue was printed at Rome in 1681, in three vols. folio. The picture gallery contains the celebrated portrait of the "Fornarina," by Raffaele (her lover), and the yet more celebrated portrait generally known as that of Beatrice Cenci [see CENCI], painted by Guido. There is also a fine villa, with very extensive gardens, belonging to the same family, at Rome, near the Thermæ of Diocletian, and another in the neighbourhood of Albano.

BARBERINI VASE. See PORTLAND VASE.

BAR'BERRY, a genus of plants (*Berberis*) belonging to the order BERRERIDACEÆ, among which it is immediately known by its shrubby habit, berried fruit, and the presence of glands upon its petals. There are six sepals, six petals, and six stamens; the ovary is one-celled, with a few ovules. The barberry is remarkable for the irritability of its stamens, which, when the filament is touched on the inside with the point of a pin, bend forward towards the pistil, touch the stigma with the anther, remain curved for a short time, and then partially recover their erect position; this is best seen in warm dry weather.

The species of which this genus consists are interesting both for their utility and their beauty. The acid quality of the fruit has rendered all the species more or less esteemed: that of *Berberis aristata* is dried by the mountaineers of India as raisins, and sent to the plains for sale. The bitterness and astringency of the bark has caused them to be received into the list of useful medicinal plants; and it was ascertained by Royle that the *Asiatic* *Indicus* (*Lycium Indicum*) of Dioscorides was an Indian species now called *Berberis Lycium*. The "barberry bark" of the Indian Pharmacopœia is from the roots of the two species already mentioned, and of *Berberis asiatica*. It is a tonic, antiperiodic, and diaphoretic, and is of great value in fevers, debility, diarrhoea, dyspepsia, &c. The Hindus make an extract, which they call "rusot," and use in various forms of eye disease.

Berberis vulgaris, or common barberry, inhabits equally the north of Europe, Asia, and America, in woods and thickets, especially in limestone countries. It is usually a bush from 4 to 6 feet high; but in Italy it becomes as large as a plum-tree, living a couple of centuries or more. The wood is hard but brittle, and is chiefly employed by the dyers for staining yellow. The acid qualities of this fruit render it unfit to eat raw, but it makes one of the most delicious of preserves. A yellow dye is made from the bark of the barberry. The barberry is subject to the attacks of a fungus, *Æcidium*, which covers the leaves with yellow spots.

BAR'BET (Capitonidæ) is a family of birds belonging to the order VOLITORES. They are distinguished by their large conical beak, puffed out at the sides of its base, which is bearded with five tufts of bristles directed forwards. The wings are short, the proportions heavy, and the flight low. Their food consists of seeds, fruits, and especially in the case of the American species, of insects. They live in pairs during the breeding season, which is in the spring, and breed in the holes of trees. They generally associate in small flocks, and many species are richly coloured. They are indigenous in Asia, Africa, and America. Mr. Wallace, in his "Tropical Nature," says that the species found in Asia and Malaya are "mostly green, but adorned about the head and neck with patches of the most vivid reds, blues, and yellows in endless combinations. The African species are usually black or greenish-black, with masses of intense crimson, yellow, or white mixed in various proportions and

patterns; while the American species combine both styles of colouring, but the tints are usually more delicate, and are often more varied and more harmoniously interblended."

The bristly barbet (*Pogonias hirsutus*) is a native of Africa, and remarkable for a tuft of bristles on the chest. The throat, head, and neck are deep black, the upper plumage brown and spotted, and marked with sulphur yellow. The under plumage is greenish sulphur, spotted with blackish. It is about 7 inches long.

The Cayenne barbet (*Capito cayanaensis*) is an inhabitant of Guiana. It loves the solitude of the inmost recesses of the forests, where it nestles in holes of trees, a personification of epicurean enjoyment, moving only now and then to catch an insect. It has two toes in front and two behind; the inner hind toe is short.

The Ceylon barbet (*Megalania zeylanica*) is abundant in Ceylon, where it breeds in the holes of trees, laying three or four pure white eggs. It feeds upon fruits and berries of all kinds, and probably also upon insects and small birds, as Sir H. Layard found that a specimen confined in an aviary destroyed and swallowed whole the little Amadine which were placed with it. When confined in a small cage this individual set to work to dig his way through the wood, and hammered upon it vigorously in the manner of a woodpecker.

("A Monograph of the Capitonidæ or Scansorial Barbets," by C. F. T. Marshall and by F. L. Marshall, 1871.)

BARBETTE, an earthen mound behind a rampart, by which heavy guns are brought above the parapet. By this arrangement the gun is raised higher than the embrasures, and though more exposed to the enemy's fire it possesses a much greater freedom of range. One or two ironclads have been built for the British navy having guns in barquette towers rising through the upper deck. The guns in these are loaded and trained within the shelter of the tower, and are then raised and fired by the means of machinery, the recoil of the gun being utilized to lower it again after firing to the loading position.

BAR'BICAN, in ancient fortification, was usually a small round tower for the station of an advanced guard,



Walmgate Bar and Barbican, York.

placed just before the outer gate of the castle-yard, or ballium. In cities or towns the barbican was a watch-tower, placed in some important point of the circumvallation. It had sometimes a ditch and drawbridge of its own. The

street of London called Barbican received its appellation from its vicinity to a tower of this sort attached to the city wall, the remains of which were visible to the close of the last century.

BARBITON, the name of an ancient Greek instrument. It had many strings and was made wholly or in part of ivory, but it differed from the lyre. In the sixteenth and seventeenth centuries the name was used for an instrument of the viol class, probably by an error of spelling for the *BARVION*.

The original barbiton (or barbitos) is incorrectly attributed by a careless error to Amarcion, but the poet alludes to it as already in existence. It had more strings than the lyre, and greater resonance—hence the preference of Amarcion; and is sometimes called by the Greeks the “many-sounding or Asiatic lyre.” Horace (Ode 1) alludes to it as a native of Lesbos (Asia Minor).

BARBOUR. See *BARRETTES PARLIAMENT*.

BARBOU, the name of a family of French printers, who for many years rendered themselves famous for the correctness as well as elegance of the works which issued from their presses.

Jean Barbou, the first of the name who is known, was settled at Lyons, where he printed the works of Clement Marot, 1539. His descendants continued to exercise their art for more than two centuries. Two brothers of the family settled at Paris, Jean Joseph Barbou in 1701, and Joseph Barbou in 1717. Joseph-Gérard Barbou, nephew of the two Barbous last mentioned, became a bookseller in 1746, took the printing-office of his uncle Joseph's widow in 1750, and soon afterwards engaged in the series of classics which bears his name.

BARBOUR or **BARBER**, **JOHN**, a divine, historian, and poet of Scotland, was born at Aberdeen about the year 1316, and died about 1395. Having received a learned education he entered into holy orders, and was promoted by King David II. to the archdeaconry of Aberdeen in 1356. His love of learning was so strong that he continued to prosecute his studies even after his promotion, and with this view he prevailed upon his sovereign to apply to King Edward III. for permission to reside for a time at Oxford—the letter of safe-conduct for which, with three scholars in his company, all coming to perform scholastic exercises, is preserved in Rymer's “*Fœdera*.”

Although the archdeacon was famed for his extensive knowledge in the philosophy and divinity of the age in which he lived, he gained a greater reputation, even at that time, by his poetry, in which he composed a history of the life and glorious actions of King Robert Bruce. It is remarkable, that though Barbour was a Scotsman, his versification and language are more intelligible to a modern English reader than that of any other poet of the fourteenth century, his great contemporary Chaucer himself not excepted.

The first known edition of “*The Bruce*” was published at Edinburgh in 1616, in 12mo; but an earlier is believed to have existed. The best public edition is that by Dr. Jamieson (4to, Edinburgh); but in 1856 Mr. Cosmo Innes produced a superior one for the Spalding Club.

BARBUDA, a small island in the West Indies, being one of the Leeward or Lesser Antilles group. It is 10 miles long by 8 broad. It is of coral formation, with a flat and thickly-wooded surface in which deer formerly abounded. The island belongs to the Codrington family, who have held it under lease from the crown since 1684, upon the service of presenting a fat sheep to the governor-in-chief whenever he visits its shores. This is usually commuted for a buck or a turtle, the latter being very abundant on the island. Deer are not so numerous as formerly, much of the undergrowth having disappeared as cultivation extended. Corn, cotton, sugar, tobacco, and indigo are grown by the 2000 inhabitants settled on the island, and the rearing of cattle

is also extensively carried on. It is almost destitute of springs, like Antigua, from which it is distant 30 miles in a northerly direction. The coast is low, and beset by reefs and shoals, but the climate is so salubrious that the island serves as a sanitarium for its neighbours.

BARÇA, a district in the east of Tripoli. The name Barca is the modern form of the Greek word *Barke*, a colony of Cyrene (Herod. iv. 160). It is stated by Seylax to have been 100 stadia from its harbour, which afterwards became the town called Ptolemais, now Tolometa. The situation of Barca appears to have been in the plain of Merge, a high table-land on the hills of Cyrenaica above Tolometa. Herodotus gives an interesting account of Barke, of its rivalry with Cyrene, and of the invasion of the Persians from Egypt, who took Barke by treachery after a long siege, and carried away a great number of its inhabitants into Asia, where Darius, the son of Hystaspes, settled them in Bactria (iv. 204). The territory of Barke occupied the western part of Cyrenaica, and its inhabitants seem to have been a mixture of Greeks from Cyrene and of native Libyans. When that country became subject to the Ptolemies, these kings built the town of Ptolemais, which drew away from Barke most of its remaining Greek inhabitants. Barke, however, in the first ages of Christianity had its bishops distinct from those of Ptolemais. After the Saracens conquered Egypt they entered Cyrenaica, and Barke, or Baranah as they called it, became their chief town in that province. Hence the Arab geographers speak of the kingdom of Barca, which is synonymous with Cyrenaica. Cyrene long before this was in ruins. See *CYRENE*.

Under the Fatimide caliphs of Egypt the oppressions of the Saracen governors obliged the people of Barca to emigrate, and most of them passed into Egypt. Della Cella, however, mentions a treaty of commerce in 1236 between the republic of Genoa and Busacherino, a Mohammedan chief, who styles himself “Lord of Africa,” by which the Genoese were allowed to trade “from Tripoli to the extremity of the kingdom of Barca.” Since that time the town of Barca has disappeared, but there are a few ruins known as *El-Medinah*, and the old name has remained in use among the Arabs to indicate the country which once belonged to it. About 1550 Sultan Solymán, having conquered Tripoli, united the country of Barca to it, and made a pashalik of the whole.

Tanehiera, afterwards under the Ptolemies called Arsinoe, was a town of Barca, and its walls, which were repaired by Justinian (Procopius, “*Peri Ktismaton*,” lib. vi.), still remain in a good state of preservation. It has resumed its original name, slightly altered to *Toera*, and its ruins are occupied part of the year by wandering Arabs. Ptolemais, or Tolometa, is likewise in ruins and deserted, as well as Berenice, now Bernie, and Apollonia, the former port of Cyrene. Bengazi has about 2000 inhabitants; most of the houses are built of mud, and are liable to be washed away by the heavy winter rains. Derna is a more considerable town than Bengazi, and has a somewhat better appearance. Both places carry on a little trade by sea. The rest of the country is occupied by nomadic tribes, as in the time of Herodotus. The whole of the Libyan Desert to the westward of Egypt, and as far as Fezzan, is often called the Desert of Barca.

BARCAROLE, a kind of song in the Venetian language, sung by the gondoliers at Venice. These airs are often composed for the common people, frequently by the gondoliers themselves. The airs are generally simple, but full of melody, and frequently have considerable refinement. Formerly most of the gondoliers knew by heart the greater portion of “*Gerusalemme Liberata*” of Tasso, and sang it in their gondolas in alternate stanzas. But Tasso is no longer sung by the gondoliers; they have still, however, their songs in response to each other. The old barcarole was sung in parts, at stem and stern of the same boat, by

its own gondoliers. The well-known airs "La Biondina in Gondoletta," and "O Pescator dell' Oude," are pleasing specimens of this species of song. As a musical term in present use *barcarole* means any piece of music written somewhat in the style of the above. The great characteristic of this fascinating movement is a rhythm of triplets, in twos (8), or in fours (12), with only the first and last note of the triplet used for the most part, the entire triplet of course occurring here and there to break the monotony. Charming examples may be found in Mendelssohn's "Songs without Words" (Op. 19. No. 6), in the very favourite *barcarole* from Sir Sterndale Bennett's Fourth Pianoforte Concerto, &c. The swaying rhythm is felt to indicate the play of the oars and the rise and fall of the boat.

BARCELONA (Barcino—*Barkinon*, Ptolemy), a fortified city and port of Spain, on the Mediterranean, and the capital of the province of the same name. It was formerly the capital of Catalonia. The site of Barcelona is a rich plain, watered by many small streams, and surrounded by swelling hills. The population, with Barceloneta, was 255,100 in 1877.

An ancient town on the same site is said to have been the capital of the Laetani, a nation inhabiting the country extending from the Pyrenees to the river Ter. However this may be, Barcelona was founded here about 235 B.C., by Hannibal Barcino, or Barcino (the father of Hannibal), who gave to it the name of his family. When the Carthaginians were expelled from Spain in 206 B.C., Barcelona fell into the hands of the Romans, who made it a colony, with the additional name of Faventia. In A.D. 411 the Gothic king Ataulphus made his triumphant entrance into it. During the contests with the Moors in Spain it frequently changed masters, and was for a while an independent place, but in 1131 it became permanently united to Aragon. In 1640 the Barcelonians rose against Philip IV., and the place was besieged by the Marquis de Los Velez, but the inhabitants forced him to raise the siege, and, assisted by the French, resisted the troops of Philip for twelve years. During the struggles between the houses of Austria and Bourbon for the throne of Spain, Lord Peterborough besieged and took Barcelona for Charles of Austria in 1706; and it was held for him till 1711, when, after a desperate defence, it was taken by assault by the forces of Philip V., under the command of the Duke of Berwick.

From this time Barcelona enjoyed peace till the commencement of the war with France under Bonaparte, for whom it was taken in 1809, by General Duhesme; and it has since suffered repeatedly and severely, as well from foreign as domestic warfare. In 1841 and 1842 particularly, insurrections, chiefly on account of commercial regulations, were with difficulty repressed, and only with great loss. In the last-named year the fort of Monjuich only remained in possession of the government, from whence, by order of Espartero, then regent, the town was bombarded. The civil war which closed in 1876 also inflicted inconvenience and loss upon the city.

Barcelona is divided by a pleasant promenade, planted with plane trees, running down the centre, called La Rambla, into two almost equal parts—the old city and the new. In the old part the streets are narrow and winding. In the modern town they are wide and regular. The houses in the old town are generally four or five stories high, built of brick, and furnished with numerous windows and balconies, and usually having flat roofs. In the modern town hewn stone was largely employed, and the architecture is often of the modern English style. The churches are numerous and very ancient. The cathedral, founded in 1298, is an elegant Gothic building, and stands on the highest part of the old town. It is surmounted by two noble towers, and is famous for the splendour of its stained-glass windows, and for its monuments, among others that of Raymond Beranger and his wife. The churches of

Santa-Maria-del-Mar, San-Pablo-del-Campo, Santa-Catalina, San-Miguel, Santa-Anna, San-Jaime, and others, are remarkable for their antiquity, their elegant structure, or their decorations. Of the other public and private buildings the most remarkable are the Palacio de la Diputacion, in which the sittings of the Audiencia, or Supreme Courts of Catalonia, are held, and in which are deposited the archives of Aragon, the most complete collection of the kind in Europe, dating from the year 874; the buildings on the Plaza-del-Palacio ("palace-square"), among which are the Lonja or Exchange, the Custom House, and the Puerta-de-la-Mar ("sea-gate"); the Convent-de-la-Merced, and that of Santa Clara; and the theatre, which is one of the largest and best conducted in Spain. The climate is most salubrious, and the environs of the town are delightful; the plain in which it stands is studded with neat country seats, and laid out in gardens, extending to the curved line of low hills between the Besos and the Llobregat.

Barcelona is the seat of a bishop. It contains eight hospitals, a university, an ecclesiastical seminary, a society of belles-lettres, several colleges, and literary and scientific establishments, public libraries, and schools of painting, navigation, surgery, and practical medicine.

The city is defended on the land side by the castle of Monjuich, situated on an eminence at the south-west of the city, and on the sea side by a wall 380 feet long and 50 wide, which is a favourite lounge with the citizens. Since the removal of the city walls in 1854, a large and handsome suburb has been formed, and there has been a gradual improvement in all those circumstances of living by which in modern times the advance of civilization is tested.

Barcelona is the most important manufacturing and trading town in Spain, and the second city in point of population. It was at one time the rival of Genoa and Venice, and in renown its hardy mariners were second to none. The staple manufactures are wool, cotton, and silk. The harbour is formed by a long mole which runs in a southerly direction, and has a lighthouse and batteries near its extremity. It has 20 to 30 feet water within the mole, but it is exposed to the winds in the bay. Between the mole and Monjuich there is a bar at the entrance of the harbour, which formerly had not more than 10 feet water, owing to the deposits of the two rivers. The bar was considerably lowered by dredging vessels in 1875, so as to allow large ships to enter, and a general improvement of the harbour has since been carried out. The imports are cotton, sugar, coffee, cocoa, indigo, and other colonial products, chiefly from Cuba and Porto Rico, hemp, coals, corn, deals, salt fish, hides, iron, hardware, &c. The trade with the Levant and France is active. The exports are wrought silks, soap, fire-arms, paper, hats, ribbons, wine, brandy, oil, vernicelli, cork bark, fruits, &c. Most of the vessels which enter the port are Spanish, engaged in the coasting trade. The number of vessels which enter and clear annually is about 15,000, of 1,750,000 tons burden, of which 300 (of 200,000 tons) are British. Amongst the articles imported from Great Britain are coal, pig-iron, bricks, and different kinds of machinery.

Barcelona is entitled to the honour of having compiled and promulgated the famous code of maritime law known by the name of "Consolato del Mare;" and the earliest authentic notices of the practice of marine insurance, and the negotiation of bills of exchange, are to be found in her annals. On this subject, as well as on many others connected with the former commerce of Barcelona, the "Memorias Historicas, sobre la Marina, Comercio, y Artes de Barcelona," by Capmani (in four vols. 4to), is a most valuable work. This noted commercial code was drawn up in the thirteenth century, at which period, says Ford in his "Handbook of Spain," "Barcelona was a city of commerce, conquest, and courtiers; of taste, learning, and luxury." When Columbus returned to Europe after the

discovery of America, he was received here in 1493 by Ferdinand and Isabella.

The suburb of Barcelonetta is a small and pleasant town on the south-east of the city, between the port and the lighthouse. It consists of twenty-four parallel streets, intersected by fifteen others at right angles, all 20 feet wide. The houses are uniform, built of brick, and one story high. This suburb is chiefly inhabited by sailors and others employed in the navy or merchant vessels. Its population is 6000.

BARCELONA, a seaport of Venezuela, in South America. It stands in 10° 10' N. lat., and 64° 47' W. lon., on a small river, the Neveri, about 3 miles from the shores of the Caribbean Sea. The town is ill built and dirty. The estuary of the Neveri is so shallow as not to admit vessels of any considerable size, and is besides exposed to the north-east, north, and north-west winds. At a distance of about 3 miles from the shore is a small rocky island, called Borracha, inhabited by fishermen, which on its south side affords a safe anchorage for ships of the largest size. Barcelona is very unhealthy. It had in 1807 a population of 15,000 persons, half whites and half mulattoes and negroes. The population is now only 7000.

BARCELONETTE, a small town in the department of Alpes Basses, in France, is situated on the Ubaye, in a lovely valley 3818 feet above the level of the sea, and 11 miles from the Italian frontier. The town has a college, and a tribunal of first instance; it was built in 1230 by Raymond Berauger, and named from Barcelona in Spain, whence his ancestors came. It is one of the prettiest towns in the French Alps. In the wars between France and Savoy the town was often taken; it has belonged to France since 1715. On the neighbouring mountains, which afford good pasture, great numbers of horned cattle and sheep are fed. Population, 2500. Barcelonette was the native place of Manuel, the liberal deputy, to whose memory a monument has been constructed in the principal square. It consists of a fountain, surmounted by a funeral urn, and having on one of its sides a bust of Manuel, with the inscription, taken from Berauger, "Bras, tête et cœur, tout était peuple en lui."

BARCLAY, ALEXANDER, was an elegant writer of the sixteenth century, but whether English or Scotch by birth is disputed. He was educated at Oriel College, Oxford, about 1495. After finishing his studies there he went into Holland, and thence into Germany, Italy, and France, where he applied himself assiduously to the languages spoken in those countries, and to the study of their best authors. Upon his return home he became chaplain to Bishop Cornish, who appointed him one of the priests or prebendaries of the College of St. Mary Ottery, in Devonshire. After the death of his patron he became a monk of the Benedictine monastery of Ely, where he continued till the suppression of the monastery in 1539. On the 30th April, 1552, he was presented by the dean and chapter of Canterbury to the rectory of All-hallows, Lombard Street, in London, but did not enjoy that preferment above the space of six weeks. He died in the June following at Croydon, in Surrey, where he was buried in the parish church. That Barclay was one of the refiners of the English language, and left many testimonies behind him of his wit and learning, cannot be denied. The work by which he is more commonly known is "The Shyp of Fools of the Worlde" (folio, Lond., R. Pynson, 1509). This work was partly a translation and partly an imitation of a German work of the same title by Brandt. It was practically the only important poetical work during the reign of Henry VII., except Skelton's "Colin Clout" and Stephen Hawes' "Pastime of Pleasure." The "Ship of Fools" contains satirical sketches of all the follies of the day, and is therefore of priceless value to antiquarians, in addition to its very considerable poetic merit.

BARCLAY DE TOLLY, MICHAEL, PRINCE, a celebrated Russian field-marshal, was a descendant from a branch of the Scotch family of Barclay, to which John Barclay (author of "Argenis") and Robert Barclay (apologist of the Quakers) belonged. His family emigrated to Livonia, where he was born in 1750. Having been adopted by the Brigadier Van Vermonden, he entered a Russian cuirassier regiment when very young, and fought as a simple sergeant with great bravery in the campaigns against the Turks, the Swedes, and the Poles, 1788-94, continually and rapidly rising in rank. He lost an arm in the battle of Eylau, where he held a command, being now a major-general, and was compelled in 1808 to retire for a time for rest and recovery. The following year he resumed his command, and surprised the Swedes at Umeo by a march of two days over the ice which covered the Gulf of Bothnia. The Emperor Alexander made him governor-general of Finland in 1809, and in 1810 nominated him minister of war, an office which he retained till 1813, though his foreign origin caused him to be regarded with much jealousy by the Russians. In 1812 he was commander-in-chief, but having lost the battle of Smolensko he gave way to Kutusov. He was reappointed after the death of the latter, and after the battle of Bautzen (26th May, 1813) he was named commander-in-chief of the combined Prusso-Russian army, Wittgenstein under him commanding the Russians, Blücher the Prussians, and the Grand-duke Constantine the Russian Imperial Guard. On the 31st of March, 1814, the day on which the allied armies entered Paris, Barclay de Tolly was named general field-marshal, and created a prince. On his return to St. Petersburg the emperor gave him a most distinguished reception, and appointed a grand review to be held in his honour. He died the following year (1818) at Insternburg, while on his way to the Bohemian baths. His reputation stands very high as a skilful military commander, and his undaunted courage was combined with great humanity in the conducting of the operations of war. He it was who advised the retreat into the interior before Napoleon's invasion of Russia in 1812, which left the cruel climate to do its worst, and which in fact was the true cause of the utter collapse of the invasion and the ultimate downfall of Napoleon. The absolute plans are due to General Pfull, but the masterly idea must be credited to the genius of Barclay de Tolly.

His surname De Tolly arose from the paternal estate of Tolly (or Towie) in Aberdeenshire, which had belonged to his family before their emigration from Scotland.

BARCLAY, JOHN, was born, according to the peritrait prefixed to his "Argenis," at Pont à Mousson, in Lorraine. He studied at the college of the Jesuits in his native place, and the Jesuit fathers, observing the dawning of his genius, attempted, according to their usual policy, to add so promising a name to their own illustrious list of brethren. This was opposed by the father, who in 1603 went to England accompanied by his son. In 1604 he dedicated to James I. part of the famous "Satyricon," generally known by the name of "Euphormio," which he bestowed on himself as author. In 1615 he removed to Rome, where Bayle says he enjoyed the patronage of Paul V. In 1621 was published the first edition of the work by which his name has been best known, "Argenis," a romance full of incident and description. This work, as well as the "Satyricon," is written in Latin, and the style has received the commendations of the greatest scholars. It is generally published with a key to the real names supposed to be represented in fictitious characters. Thus, Melander is said to represent Henry III. of France; Poliarclius, Henry IV., &c. Its popularity was of long duration. The admiration of Cowper and D'Israeli have made the name familiar to modern English readers. In 1628 there was published an English translation of it in 4to, with the title "John Barclay his Argenis, translated

out of Latine into English: the prose vpon his maiesties command by Sir Robert Le Grys, Knight, and the verses by Thomas May, Esq." Another translation appeared in 1636, and a third in 1772, with the title of "The Phoenix, or the History of Polyarchus and Argenis." Barclay died at Rome, 1621.

BARCLAY, ROBERT, was born 23rd December, 1648, at Gordonstown, in the shire of Moray. His father was Colonel David Barclay of Ury, the lineal representative of an ancient family who had for five centuries ranked amongst the landed proprietors of Scotland. The extravagance of Robert Barclay's grandfather dissipated the patrimonial possessions, and David Barclay, who was the eldest of several sons, went into the army, and served as a volunteer under Gustavus Adolphus, king of Sweden. Having attained the rank of major, he remained abroad till the civil wars broke out in his own country, when he returned home, and became colonel of a regiment of horse on the side of the Royalists. On the accession of Cromwell's party to power he retired from his military employments, married, and purchased a house at Ury, near Aberdeen, which became the seat of the family.

David Barclay had three sons. Robert, the eldest, after receiving the rudiments of his education in his native country, was sent to Paris to pursue his studies under the direction of his uncle, who was rector of the Scots College in that capital. His deportment and character so endeared him to his uncle that he offered to make him his heir, and to settle a large estate immediately upon him if he would remain in France. The offer was at once rejected. He had been won over to the Roman Catholic faith, and his father was opposed to his continuance in the country. The father had been converted to the views of a sect which had then existed only ten years—the Society of Friends.

After an interval of a few years Robert followed the example of his father, and in the year 1667 avowed himself a Quaker. This change of opinion had not been produced without a degree of thought and investigation almost beyond his years, for he was not then more than nineteen. It also gave a decided bias to his future studies. He learned the Greek and Hebrew languages, in addition to the Latin and French, in which he had made great proficiency in France. To his other requirements he added an acquaintance with the writings of the fathers, and with ecclesiastical history. No sect ever encountered in its origin more persecution and derision than the Quakers; though it is an error to suppose that this was owing to their adopting as a distinguishing badge certain eccentricities of dress, manners, and conversation. The Friends, at their origin, did not adopt any peculiar marks; they only dressed, behaved, and spoke like all the sober religious people of that day, and abstained from all extravagancies; they kept strictly to this plainness when all other people were frightened out of it, after the restoration of Charles II., and when all quiet folk lay under the stigma of "puritanism." Their meetings, though conducted with the utmost propriety, were prohibited, and those who attended them were taken before magistrates, and committed to prison. From such intolerance even the family respectability of the Barclays did not preserve them. They bore their share in the sufferings of those times. Robert Barclay no sooner saw how much of this ill-will arose from the misapprehensions of the public concerning the principles of the Quakers than he set himself to correct them. A book having been written by a Scotch clergyman, embodying the principal charges which had been brought against the doctrines and views of the Quakers, he endeavoured to vindicate them, in a treatise published at Aberdeen in the year 1670, under the title of "Truth cleared of Calumnies." A reply being made to this publication, in which all the offensive statements were repeated, Barclay put forth a rejoinder, entitled, "William Mitchell Unmasked."

In the same year that Robert Barclay became an author he married Christian, daughter of Gilbert Mollison, a merchant of Aberdeen. The character of this lady is extolled by all who speak of her. Two years after this event he took the extraordinary resolution of walking through the streets of Aberdeen clothed in sackcloth and ashes. The motive and design of his making himself such a "spectacle to men" is detailed in what the writer calls "A seasonable Warning and serious Exhortation to and Expostulation with the Inhabitants of Aberdeen, concerning the present Dispensation and Day of God's living Visitation towards them." Barclay believed, as the Society of Friends now do, that divine revelation is not incompatible with right reason, yet that the faculty of reason alone, unassisted by divine illumination, is unable to comprehend or receive the sublime truths relative to that redemption and salvation which came by Jesus Christ. To show that the tenets held by the Society were capable of a rational vindication, Barclay employed all the powers of his vigorous intellect, and produced a succession of works, designed and calculated to accomplish this object. His most elaborate treatise is entitled, "An Apology for the true Christian Divinity as the same is held forth and practised by the People called in scorn Quakers." This and a previous work entitled "Theses Theologicæ" were originally printed in Latin, and afterwards translated by the author and published in English. In style and execution they have been deservedly admired.

The discipline or church government of the Society of Friends was as much defamed as their religious opinions. Their regulations were vindicated by Barclay in a work wherein he contrasts the internal government of the Quakers with the anarchy of the Ranters and the hierarchy of the Romanists, justifying the discipline of his sect, and defending its members "from those who accuse them of confusion and disorder, and from such as charge them with tyranny and imposition." The publication of this treatise engaged its author in a long altercation with some persons of his own persuasion, who took offence at various parts of it, as tending to violate the rights of private judgment, and to restrain the operations of the Spirit. Their opposition, being discountenanced by the Society, soon passed away, and the work itself rose into such favour among the sect that its title was changed at one of its yearly meetings to "A Treatise on Christian Discipline," and it became the standard authority on all matters to which it relates.

The importance attached by Robert Barclay to the internal order of the body, and his desire to preach the gospel (which was indeed his strong motive), induced him to accompany William Penn and George Fox to Rotterdam and Amsterdam, for the purpose of consulting the Friends in the Netherlands on some important regulations connected with their system of church government. For the promotion of this and other objects connected with the prosperity of the Society he frequently went to London to attend its annual meetings. His character and connections gave him influence in quarters where the presence of such a man might be supposed to be least welcome. He was known at court, where he was well received, and treated with marked respect by Charles II. But his dedication to Charles II., at the beginning of "The Apology," so justly admired for its high tone of patriotism and independence, shows that whatever else might have secured him such a continuance of royal favour, it was not servility or flattery.

The intellectual superiority of Barclay places him at the head of all the writers of his sect. His works contain the only systematic view of their opinions and principles. In his moral character he was free from every reproach, and his temper was so well regulated that he was never seen in anger. He died in 1690.

BARCOCHEBAS (*Shimeon Bar Cochba*, "the Son of the Star") was the title of a false Messiah, who applied

to himself the prophecy of Balaam, "There shall come a star out of Jacob, and a sceptre shall rise out of Israel," &c.

The Emperor Trajan persecuted both the Jews and the Christians. The oppression experienced by the Jews stimulated them to rebellions commotions, and they put to death many thousands of Greeks in Cyprus, Cyrene, and other places, when Trajan removed the legions from these provinces at the commencement of his second expedition against the Parthians, about A.D. 115 and 116. After the death of Trajan, A.D. 118, the Emperor Hadrian appointed J. Annianus Rufus governor of Judea. This man adopted very harsh measures against the Jews, who consequently began secretly to collect arms, A.D. 120. Soon after the return of Hadrian from his second journey to the East, about A.D. 130, the rebellion broke out. Shimeon Bar Cochba gained influence, partly by a reputation for miraculous powers, and partly by his intrepidity. He took Jerusalem about A.D. 132 without difficulty, as the garrison had probably left the town to attack the rebels. The taking of Jerusalem so animated the courage of the friends of liberty that Rufus was no longer able to resist them. The rebels occupied fifty fortified places and 985 villages. On this the Emperor Hadrian ordered his most able commander, Julius Severus, to leave his post in Britain and repair to Palestine; but the time which elapsed during his journey was favourable to the rebels. After his arrival, Julius Severus wisely avoided battles, but took a number of fortified places before he marched against Jerusalem, which he took and destroyed, after sustaining great losses. The Jews, after the capture of the city, concentrated their forces in the mountain fortress of Bethar, which was not taken until A.D. 135. It has been stated that on this occasion 580,000 Jews perished, but this must be greatly exaggerated. Probably about a tenth of this number or less would be nearer the truth. Bar Cochba fell in the combat, and his head was brought into the Roman camp. This was the final struggle of the Jews for independence, and after their defeat the city of Jerusalem was razed to the ground and the people dispersed.

BARD (Welsh, *bardd*), the universal Celtic name for minstrel-poet, and exactly translating the *aoidô* of the ancient Greeks, the *scops* of the early English, and the *skalds* of the Norse nations.

The Roman poet Lucan (i. 447) describes the office of the bard, and Tacitus ("Germania," 3) eulds their songs *barditus* (if this is not an error for *baritus*, a war-cry).

The information, however, which remains to us from classical sources relating to the bards is very scanty. Strabo (p. 197) says that the bards (*bardoî*) were singers of hymns, and poets, among the Gauls. They were, no doubt, originally spread over the greater part of Western Europe, but gave way to southern civilization; and it is from their latest retreats only, in Wales and Ireland, that we gain any materials for their history.

By the laws of Howell Dhu, made about the year 940, the *bardd teulu*, or court-bard, was a domestic officer. He occupied the eighth place in the prince's court; he held his land free, the prince was to allow him a horse and a woollen robe, the queen a linen garment. At the three principal feasts, Christmas, Easter, and Whitsuntide, he was to sit next to the prefect of the palace, who delivered the harp into his hand; and at the same festivals he was to have the robe of the *disdain*, or steward, for his fee. When he sang to the troops before a battle, the prince was to give the bard a harp, and the queen a ring of gold. Any slight injury perpetrated on the royal bard was to be compensated by a fine of six cows and 120 pence; his murder at 126 cows. The *pencerdd grolad* was another domestic bard of the higher order, who frequented the courts of the Welsh princes, though he was not a regular officer of the household ("Leges Walliæ," Wotton, London, 1730).

The bards of Wales were the oral historians of all past transactions, public and private. They related the great events of the state, and retained the memory of numberless transactions which would have perished in oblivion. But they had another talent which probably endeared them more than all the rest to the Welsh nobility, that of being most accomplished genealogists, and flattering their vanity in singing the deeds of an ancestry derived from the most distant period.

The Welsh bards were further reformed and regulated by Gryffyth ap Conan, king or prince of Wales, in the year 1078. The so-called massacre of the Welsh bards by Edward I. in his conquest of Wales (1282) has long been proved to be a mere fable. His Welsh policy was one of justice and conciliation, and met with the complete success it deserved.

Eisteddfodau, or sessions of bards and minstrels, were held in Wales for many centuries; one was held at the town of Caerwys; another at Aberfraw, in Anglesey, for the bards of that island and the neighbouring county; and a third at Mathrafal, for those of the land of Powis. The two last places were the residences of princes; and Caerwys had a royal palace that stood below the town, the residence of Llewelyn ap Gryffydd. The judges at the eisteddfod were appointed by commission from the neighbouring Welsh prince, and, after the conquest of Wales, by the kings of England. A commission for holding an eisteddfod at Caerwys, in 1568, still exists in the possession of the Mostyn family, together with the silver harp which had from time immemorial been in the gift of their ancestors, to bestow on the *chief of the faculty*. This badge of honour was about 5 or 6 inches long, and furnished with strings equal to the number of the Muses. Though since this time (Queen Elizabeth) no royal commission has been issued for holding an eisteddfod, exertions have not been wanting of later years for the revival of the bardic profession, and encouragement of Welsh literature. Annual meetings are held in Wales, under the name of eisteddfodau (which, however, they do not greatly resemble), for singing contests, for the recitation and reward of prize poems, and performances upon the harp.

The Irish carry the history of their bards to the earliest date of the supposed Milesian invasion. The details of that history, in a diffuse form, are given in Walker's "Memoirs of the Irish Bards" (4to, London, 1786). The poet Edmund Spenser ("View of the State of Ireland," folio, Dublin, 1633, p. 52) gives no favourable idea of the Irish bards of his time. He speaks of them as so far from instructing young men in moral discipline, that "they themselves do more deserve to be sharply disciplined, for they seldom use to choose unto themselves the doings of good men for the arguments of their poems;" and he goes on to give particulars of their evil doings. The Irish bards were divided into the hereditary communities of the *Filíedha* (sacred singers), the *Braithneamain* (expounders of law and custom), and the *Seanchaidhe* (tellers of historical tales). As the Welsh bards declined, after the conquest by Edward the Great, so had, long previously, the Irish bards declined when the country was brought into subjection under Henry II. Yet, as the quotation given above from Spenser shows, the fraternity still lingered in Elizabeth's time; and the queen passed some very stringent and cruel laws to extirpate them as breeders of disloyalty. It is probable that the bards of Ireland, by their songs and histories, kept alive the national feeling, and this tended to render them obnoxious to the English conquerors, and severe measures were passed against them. Carolan, who was born 1670 and died 1737, is generally regarded as the last of the Irish bards. The bards in Scotland have left but few records, but it is known that in all essential characteristics they resembled the Irish bards.

BARDSEY, a small island in the Irish Sea, belonging to Carnarvonshire, in Wales, near the north point of Cardigan Bay. Its distance from the nearest point of the promontory of Braich y Pwll, in Carnarvonshire, is about 2½ miles; its length is somewhat more than 2 miles by 1 in breadth, comprising about 370 acres of land, of which nearly a third is occupied by a mountainous ridge, the sea front of which presents perpendicular and projecting cliffs, in which the hazardous trade of taking eggs, by the adventurer being let down by a rope from the top of the cliff, is practised during the resort of puffins and other birds in the breeding season. Bardsey is only accessible to the mariner on the S.E. side, where there is a small well-sheltered harbour, capable of admitting vessels of 30 or 40 tons burden. The soil of the island is tolerably fertile, producing excellent barley and oats. There is a lighthouse on the island, with a light 140 feet in height. The name of the island (Bard's Ey) means the Isle of Bards. There was formerly an abbey of some celebrity on it, which was suppressed by Henry VIII. Numerous graves lined with stone, a large building, and a ruined chapel or oratory, are the only remains. The island contains eighty inhabitants.

BARDWAN (sometimes spelt *Burdwan*, correctly *Bardha*

India, under the lieutenant-governor of Bengal, lying between 21° 36' and 24° 9' N. lat., and between 86° 35' and 88° 32' E. lon. The area is 12,719 square miles, and the population 7,500,000. It comprises the districts of Bardwan, Hooghly, with Howrah, Midnapur, Bankura, and Birbhum. It is bounded on the north by the districts of the Santal Parganas and Murshidabad, on the east by those of Nadia and the twenty-four Parganas, on the south by the Bay of Bengal, and on the west by Morbhanj state and Manbhum district.

The district of Bardwan is for the most part flat, and the scenery tame and uninteresting, the only exception being the north-western corner adjoining the Santal Parganas, where the country is undulating and covered with jungle, which gives shelter to tigers, leopards, wolves, and other wild animals. Except in this corner the land is covered with large rice-fields, and studded with little hamlets hidden among clumps of bamboos, palms, plantains, and mangoes. The soil consists of an alluvial deposit of great depth. There are no hills. The principal rivers which flow through Bardwan are the Damodar, the Dhal-kisor or Dwakeswar, the Khari, and the Ajai, all of which eventually join the Bhagirathi or Hooghly. The Damodar marks a portion of the western boundary of the district, and the Ajai forms a natural boundary line for some distance on the north. The Barakhar, too, though not properly speaking a river of Bardwan, flows for a short distance along its north-west boundary and separates it from Manbhum district until it falls into the Damodar. A number of small tributaries of these rivers rise in and flow through the district, and a network of small creeks and water-courses intersects the country.

The principal crop in Bardwan, as in other districts of Bengal, is rice. The *aus*, or autumn crop, is sown in May and reaped in August or September; and the *aman*, or *haimantik* (winter) crop, is sown in June or July, and reaped in November or December. Aman rice requires much water, and is always sown on *sali* or low-lying land, which retains more or less moisture the whole time the crop is in the ground; it is always transplanted. Aus rice, on the other hand, is grown on *sona* land, which is higher and therefore drier than *sali*.

The roads in the district are on the whole in fairly good condition, and the East Indian Railway has two main lines running through it. The principal manufacture is the weaving of silk *aris* and *dhutis*; there is also a considerable number of workers in gold, silver, and brass. The chief articles of export are rice, tobacco, pulses of all kinds,

wheat, rapeseed, oil-cake, jute, sugar, salt, English and country made cloth, cotton, &c. The principal imports consist of English piece goods, manufactured iron, salt, spices, coconuts, and castor-oil.

The Raniganj subdivision of Bardwan district is noted for its coal-mines. The coal-field extends from a few miles east of the town of Raniganj to several miles west of the Barakhar river, the greatest length from east to west being about 30 miles, and the greatest breadth from north to south about 18 miles. The area included by the coal-bearing strata is estimated at about 500 square miles. The mineral is "a non-coking bituminous coal, composed of distinct laminae of a bright jetty coal, and of a dull more earthy rock." The chief objections to the employment of Raniganj coals in India are—(1) its non-coking property; (2) the small proportion it contains of fixed carbon, on which the value of coal for heating purposes depends; (3) the large proportion of ash, a greater quantity of Raniganj coal being required to do the same work as good English coal; and (4) its liability to spontaneous combustion, due to the large proportion of iron pyrites it contains. It has been proved practically that no Indian coal can do more than two-thirds, while most of it does not do more than one half the work of the same quantity of English coal.

The district suffers very seriously from the ravages of endemic fever. It is described as "an exaggerated and congestive form of malarious fever, most frequently of the intermittent type."

BARDWAN, the chief town and civil station of the above district, is situated on the Banka *naid*, at a distance of 67 miles from Calcutta. The principal buildings are the palace of the maharaja, a fine edifice, many of the apartments in which are furnished in European fashion; the Sivalaya, a collection of 108 temples arranged in two circles, one within the other; and the shrine of Pirbahau. The town figures more than once in history, having been captured by Prince Kharram (afterwards the Emperor Shah Jahan) in 1624, and again in 1695 by the Hindu rebel Subah Singh, who slew the rajah, and was soon afterwards himself killed by the rajah's daughter, whom he attempted to outrage. There is a station of the East Indian Railway at Bardwan. The population is 33,000.

BAREBONES PARLIAMENT, the constituent convention summoned by Cromwell after the dissolution of the Rump Parliament in 1653, when "we did not hear a dog bark at their going," but when it was felt that the Commonwealth was thus improperly left entirely in the hands of the army. Cromwell himself, in after years, tells the story of his perplexity. "I will come and tell you a story of my own weakness and folly. And yet it was done in my simplicity; I dare avow it was. It was thought then that men of our own judgment, who had fought in the wars, and were all of a piece on that account—why, surely these men will hit it, and these men will do it to the purpose, whatever can be desired. And surely we did think, and I did think so, the more blame to me." Accordingly 156 men, "faithful, fearing God, and hating covetousness," were summoned by the Council of State: Montague, Howard, Cooper (afterwards Lord Shaftesbury), Admiral Blake, and the like, the best who could be found. Amongst them was a Mr. Francisgod Barbone, a leather merchant in Fleet Street, London, whose name was seized upon by those wishful to throw ridicule on this "Puritan convention of the notables," and by a little alteration of spelling was made to yield the nickname which has attached itself for ever to this unfortunate assembly, that of the "*Barebones* Parliament." To this constituent convention Cromwell, in giving up the supreme authority, made his first speech (4th July, 1653), a burst of rugged eloquence, full of a strange enthusiasm, even yet able to fire the heart of a sympathetic reader. "Own your call,"

he cried, "for indeed it is marvellous, and it hath been unprojected." But the *Little Parliament* (so styled at the time in contrast to the *Long Parliament*) responded to the appeal with such vigour as to defeat Cromwell's object and their own. A reform of the Court of Chancery, with its 23,000 unheard cases, a reform of the corrupt state of the church by the abolition of lay patronage and of tithes (amongst other things), the permission of civil marriages, are only some of the tasks they undertook as preliminary to settling the constitution. The result was that a strife arose without the House and within it also, that the Conservative majority by a snatch vote resolved "that the sitting of this Parliament any longer will not be for the good of this Commonwealth," and that the sovereign authority which they had received from the lord general of the forces was handed back to him (5th Dec., 1653). After all, therefore, at the end of the five months the lord general and his officers had to do what they had shrunk from doing at the beginning, and create the well-known "Instrument of Government," with Oliver Protector at the head of the Commonwealth.

It has taken nearly 250 years to arrive at even the preliminary consideration of the tasks which were actually begun by the decided Barèges Parliament.

BARÈGE, a material used for women's dresses, made of a mixture of silk and worsted. An inferior kind is composed of cotton and worsted.

BARÈGES, a small town in the department of Pyrénées Hautes, in France, is situated between two mountain chains, about 2½ miles from Bagnères-de-Bigorre. It is celebrated for its warm sulphurous springs, which were first brought to notice by Madame de Maintenon in 1676. The town is inhabited only during the summer and autumn, at which time it is visited by about 1500 invalids. The springs have a temperature of from 64° to 108° Fahr. They are the highest in the Pyrenees, being 4085 feet above the sea. The village is exposed to some danger from avalanches, and the winters are long and cold, so that no population remains, except a few people who take care of the houses. The French Government have erected two hospitals at Barèges—one for officers and the other for soldiers—the waters being very efficacious in the cure of gunshot and other wounds. They are also very beneficial in cases of rheumatism, stiffness of the joints, and scrofulous complaints.

BAREILLY (*Bareilly*), a district in British India, in the Lieutenant-governorship of the North-western Provinces, lies between 28° 1' and 28° 54' N. lat., and between 79° 1' and 80° 29' E. lon. The area is 2982 square miles, and the population 1,600,000. Bareilly is a district of the Rohilkhand division, and is bounded on the north by the Tarai, on the east by Nepal and Shahjahanpur, on the south by the Shahjahanpur and Budann, and on the west by Budann and the Rampur state.

As a whole the district may be described as a level tract, intersected by numerous rivers, and thickly dotted with noble groves, which form the characteristic feature of the landscape. Almost every village possesses an abundant supply of mango and shisham trees, while many have beautiful plantations of bamboos. In seasons of drought elsewhere the *khadîr*, or alluvial tract of Bareilly, is clothed with magnificent crops. Inundations do more good than harm, by destroying the white ants and depositing layers of fresh soil, which supply the place of manure. The district is naturally traversed by several sub-Himalayan streams, of which the chief are the Ramganga and the Deoha. The former river has deep and well-defined banks, but frequently changes its course through the friable alluvial channel in which it runs. The Deoha, springing from the Kumaun Hills, is strongly impregnated with lime, which imparts a milky whiteness to its waters after heavy rains. The stulactites which it deposits form an

article of commerce in Bareilly, Pilibhit, and Shahjahanpur, where the lime bears a high reputation for purity.

Some of the low-lying tracts are covered twice a year by rich crops of wheat and sugar-cane; others, more sandy and less fertile, produce only a single crop of linseed or melons. The higher levels of the alluvial region are usually the most productive, as the inundations deposit their fine silt and vegetable mould at a distance from the central channels, while nearer the main stream sand and shingle render cultivation comparatively fruitless. The harvests are those common to the rest of Upper India. Owing to the abundant rainfall and the regularity of the Christmas showers, combined with the nearness of water to the surface, irrigation is not so necessary as in the Doab.

The climate of the district is largely influenced by its proximity to the hills, Bareilly city and all the northern parganas lying within the limits of the heavier storms. The rainy season begins a little earlier and ends a little later than elsewhere to the south, and the cold weather lasts longer. The atmosphere is damp, the heat moderate, and the hot winds not excessive.

BAREILLY, the capital of the district, is the most populous city in Rohilkhand, and the fifth in the North-western Provinces. It stands at an elevation of 550 feet above the sea-level, on the Ramganga river, 96 miles above its confluence with the Ganges, and is distant from Calcutta 788 miles north-west, and from Delhi 152 miles east. Good metalled roads connect the city with all the neighbouring centres of trade and population, and the Oudh and Rohilkhand Railway affords access from Lucknow and Bengal on the east, and from the Doab on the west. The city, civil station, and cantonments lie on an open plain, without walls or fortifications, intersected by a few ravines and patches of broken ground. The cantonments contain lines for a battery of artillery and regiments of European and native infantry, besides native cavalry.

The city has little architectural pretension, the chief buildings being of modern date. The ruins of the ancient fortress, founded by Baril Deo, may still be seen in the old town. A modern fort of considerable strength overlooks the artillery barracks in the cantonments, and supplies a place of refuge and defence for the station. The Nawab of Rampur has a palace near the city which he occupies on his visits to Bareilly, and lends at other times to Europeans of high official position. Most of the private houses are built of mud, only 6800 out of 22,800 being of masonry. Some of the new bazars, particularly Tughli-ganj, are clean and well built. Cotton, grain, and sugar form the chief commercial staples; but Bareilly does not rank in the first class of mercantile importance. The manufactures of furniture and upholstery are better and cheaper than elsewhere in northern India. Bareilly has a government college, with a principal and staff of professors, besides high-class schools. The local affairs of the city are managed by a municipal committee.

During the mutiny, in 1857, Bareilly was the centre of disaffection for the whole of Rohilkhand. The troops rebelled on the 31st of May, and Khan Bahadur Khan, a descendant of the Rohilla chieftains, was proclaimed governor. Most of the Europeans escaped to Naini Tal. After the fall of Lucknow, the Nawab of Fatehgarh, the Nana Sahib, Feroz Shah, and other leading rebels took refuge in Bareilly. On the 5th of May, 1858, the English army arrived before the town, and two days later the rebels fled into Oudh, and the English occupied the city.

BARETTI, JOSEPH, was born at Turin in 1716. He was originally a clerk in a commercial house, but acquired a taste for literature, and was engaged in translating Corneille. He had early applied to the study of the English language, and in 1751 he came to London, where he employed himself as a teacher of Italian. Having become known through the publication of his "Italian

Library," he was appointed secretary to the Royal Academy of Painting. He wrote a dissertation in French, "*Sur Shakspeare et M. de Voltaire*," in which he refuted many errors into which Voltaire had fallen in speaking of Shakspeare. One evening as Baretti was going to the Academy, he found himself unexpectedly involved in a street brawl. Being attacked by several men, he drew his pen-knife and wounded one of the assailants, who soon after died. He was tried on the capital charge, made his own defence, and was acquitted by the jury. Dr. Johnson, Burke, and Garrick, on the trial, gave favourable evidence as to his character. He was acquainted with many of the English literary men of his time, and especially with Dr. Johnson, with whom he was on terms of friendship. He died in 1789.

BARFLEUR, an ancient and now almost deserted town of 1100 inhabitants, in the department of Manche, France, 15 miles east of Cherbourg. It was an important seaport in the time of the Norman kings of England, but was ruined and its harbour filled up by the English in 1346. It stands on the eastern shore of the peninsula of Cotentin; it is now a mere fishing village, and has a harbour capable of admitting only small craft. About a mile to the north is a lighthouse, 271 feet above the sea, on Cape Barfleur. In 1120 Prince William, only son of Henry I., with a retinue of young nobles, sailed from Barfleur in the *White Ship* (*La Blanche Nef*), which was stranded on a rock soon after leaving the harbour, and only a butcher of Ronen regained the shore.

BARGAIN. The word bargain is from the French *bergergaigner*, to chaffer, and that from the Low Latin *barceniare*, to change about, no doubt from *barca*, a merchant-boat. In law, bargain is generally used to signify a contract in mercantile affairs which may be completed without any formal deed, such as a sale of goods, shares, bonds, &c. In the practice of the London Stock Exchange all purchases and sales between members are termed bargains, and in almost every case they are done by word of mouth merely, either "Buy of you —," or "Sell you —," as the case may be. Custom requires, however, that the bargain be entered in a book by each member at the time it is done, and it is required also by the rules of the Stock Exchange that every bargain be duly checked or confirmed early on the next business day. In the case of purchases and sales made by a broker on behalf of a client, the law requires a stamped contract, which may, however, be used to cover all the transactions of one day for any one client. A peculiar use of the word bargain is the subject of the next article.

BARGAIN AND SALE is a special phrase in English law, and signifies a mode of transferring the ownership of land. In former times, before the Statute of Uses, a man often bargained and sold his land to another for a sum of money, and this was a perfect contract of sale, and as such required nothing further to be done. But in order that the complete ownership of the land should be transferred to the buyer, it was necessary that he should obtain seisin of it; if he did not, the seller still held the land, though it was not for his own use and benefit, but for the use of the buyer. The effect of the 27 Henry VIII. c. 10, called the *Statute of Uses*, was to convert the use created by such a bargain and sale into a legal estate. The terms of the statute only applied to freehold property, and it required that a deed in writing, and sealed, should be enrolled in one of the king's courts of record at Westminster, or with the *custos rotulorum* of the county, or, in boroughs, with the mayor or other chief officer. The conveyance by bargain and sale has now fallen into disuse, the mode of transfer by lease and release having been superseded by simpler methods of transfer. All property can now be conveyed by simple deed of grant—that is, by delivery of the deed of conveyance, requiring in ordinary cases no enrolment. See 8 & 9 Vict. c. 106.

There may be a bargain as to land in Scotch law, but the evidence must be in writing. The term bargain is also used in Scotland to signify a contract or agreement for the sale of personal or movable property, in which case it is not necessary that it should be in writing, if the fact can be proved by witnesses.

BARGE (from Low Latin *barica*, dimin. of Greek *baris*, a row-boat; probably from the Egyptian (Coptic) *bari*, a boat), the name given to the heavy flat-bottomed boats used on rivers and canals for the conveyance of goods, sometimes provided with masts and sails, and at others moved by means of oars or the tow-ropes.

Large ornamental boats, such as those still belonging to the city of London and the Admiralty, are also called barges. The use of magnificent state barges has ceased with the decay of processions, but the barge of Cleopatra—"the barge she sat in like a burnished throne" ("Ant. and Cleop." ii. 2)—will ever shine resplendent in Shakspeare's verse, and the great barge of the Doge of Venice, the famous *Bucentaur*, from whose poop the yearly ring was thrown which married the Adriatic, can never fall from its place in the story of those splendid times.

BARGE COURSE, a term applied to that part of the tiling of a roof which projects over the gable end of a building, the inner part of which is stuccoed. To protect this stucco from the weather two boards called *barge-boards*, following the inclination of the roof, are often attached to the gables of old English houses, which are fixed near the extremity of the barge course, and carved in the Gothic style.

BARHAM, REV. RICHARD HARRIS, was born 6th December, 1788, at Canterbury, where his family had resided for many generations. He was educated at St. Paul's School, London, and Brasenose College, Oxford, and after having passed his examination for holy orders, he was admitted to the curacy of Ashford, in Kent, whence he removed to Westwell, a few miles distant. Mr. Barham married in 1814, and shortly afterwards was presented by the Archbishop of Canterbury to the rectory of Snargate, in Romney Marsh, Kent, a district much frequented by smugglers. Soon afterwards he became a candidate for a vacant minor canonry in St. Paul's Cathedral, and though his friends thought he had no chance of success, he was duly elected in 1821. He thenceforth devoted much of the time not required by his professional duties to contributions in prose and verse to the periodical publications of the day. He was the author of "*My Cousin Nicholas*" in *Blackwood's Magazine*, and about one-third of the articles in Gorton's *Biographical Dictionary* were written by him. In 1824 he received the appointment of a priest in ordinary of the Chapel Royal, and shortly afterwards was presented to the rectory of the united parishes of St. Mary Magdalene and St. Gregory by St. Paul, London.

Till the year 1837, when the first number of *Bentley's Miscellany* appeared, Mr. Barham had been an anonymous and comparatively unknown writer; but the "*Ingoldshy Legends*," a series of humorous tales in verse, which appeared in rapid succession in that work, brought him so much reputation that his pseudo-name of Ingoldshy no longer concealed him, and he became generally known as the author. In 1842 he was appointed divinity reader in St. Paul's Cathedral, and he was permitted to change his living for the more valuable rectory of St. Faith, London. On the 28th of October, 1844, when the queen visited the city to open the new Royal Exchange, Mr. Barham, who was a witness of the procession, caught a severe cold, from which he never recovered. He died on the 17th of June, 1845.

Mr. Barham was personally acquainted with Theodore Hook, the Rev. Sydney Smith, and several other of the distinguished wits of his day, and was, like them, a frequent diner-out; but he never neglected his more serious duties,

and was much respected by those who new him. The "Ingoldsby Legends" have attained very extensive popularity, and have consequently been often republished. The "Life and Letters of Barham," by his published in 1870.

BA'RI, TER'RA DI, a province in the kingdom of Italy, nearly coinciding with that part of ancient Apulia which was called Peucetia. It is bounded N. by the Adriatic, E. and S.E. by the Terra d'Otranto, S. and S.W. by the province of Basilicata, and W. by that of Capitanata. The province lies between 10° 45' and 11° 19' N. lat., 15° 54' and 17° 33' E. lon.; its length is about 80 miles, its average breadth about 30. The area is estimated at 2201 square miles, and the population in 1882 was 678,968. The greater part of the province lies N. of the ridge of the Apennines, which, breaking off from the main chain in the N.W. of the province of Basilicata, runs in an easterly direction to the extremity of the Terra d'Otranto. The highest summits are those of Monte San Agostino and Monte Lupolo. A small portion of the province lies on the southern slopes of this ridge. The chief river is the Otranto, the ancient *Apudus*, which runs on the western border of the province. There are several lakes, the principal of which are those of Battaglia, Jacom, and Sassano, which meet any streams nor have any known outlet. The temperature is mild and healthy, except in summer, when the heat is excessive, and dries up the springs, so that the want of pure water is then severely felt. The soil in the plains, which cover a great part of the province, especially along the sea-board, consists of a deep and very rich vegetable mould resting on a calcareous subsoil. Agriculture is the chief occupation of the inhabitants, and the province is one of the best cultivated in Italy. From the town of Bari northwards great quantities of wheat are grown. Two kinds of it are cultivated, the common wheat for bread, and a small-grained hard wheat (*grano duro*), which is preferred for macaroni, and is exported to Naples and elsewhere under the name of Barletta corn, from Barletta, where it is shipped. In the neighbourhood of the town of Bari the culture changes from corn to the olive, and the oils of Bari are in great demand. In the eastern and southern parts of the province only enough corn for the consumption is grown, the farmers' chief care being here also the olive; but the oils are only of ordinary quality. The other crops are tobacco, cotton, flax, almonds, and other fruits. Capers, liquorice, and the soda plant are also abundantly grown. The best wines are those of Trani, Bitonto, and Terlizzi. Among the domestic animals, asses, goats, and pigs are numerous; the horses are small; buffaloes and sheep, famous as in ancient times for their fine wool, are reared. A little silk is produced. The fisheries and salt works along the coast are very valuable. The province has no manufactures of importance, but shipbuilding is carried on in most of the towns along the coast. The trade is chiefly by sea with Naples, Venice, Trieste, and the coast of Dalmatia, and consists of the agricultural products mentioned above. The old Roman roads are still used in many parts of the province.

BARI (the *Barium* of the Romans), the chief town and the seat of an archbishop, stands on a slip of land which projects into the sea, 140 miles E. by N. of Naples. The most remarkable building in the city is the Gothic church and priory of St. Nicholas, which contains many splendid monuments. The festival of the saint on the 8th of May is still attended by thousands. The castle is a large and old structure. The town itself is surrounded by walls, and the streets in the old town are narrow and winding. In the new town they are spacious, and contain handsome buildings, and an air of bustle and opulence pervades the city. The population nearly doubled in the twenty years from 1862 to 1882, the increase having been from 34,063 to 60,575. A manufacture peculiar to this place is the

acqua stomatica, a cordial made of aromatic herbs and spices, which is generally drunk after coffee, and is much in request all over the kingdom. There are also manufactures of cotton, silk, linen, and soap. Bari is second only to Genoa as regards its export trade, and is by far the most important centre of general trade on the Adriatic coast of Italy. The principal exports are oil, corn, and wine. There are two harbours, but the old one is now used chiefly for fishing boats. The new one admits vessels of large size. Bari is on the railway from Ancona to Brindisi, and there is also a line to Taranto. *Barium* was a place of importance as early as the third century B.C. It is referred to by Horace, *Bari mania pisces* ("Sat." i. 5). In more modern times it fell successively into the possession of the Saracens and Normans. It has been three times nearly destroyed, and as often rebuilt on the same place. A great ecclesiastical council was held at Bari in 1098, when the *filioque* article of the Creed and the procession of the Holy Spirit were the subjects of discussion.

BARIL'LA is the commercial name given to the impure carbonate of soda imported into this country, principally from Spain, the Canary Islands, and Sicily. The best is brought from Alicante, in the neighbourhood of which place it is prepared chiefly from the *Salsola soda*. This plant is there cultivated in grounds close by the sea, embanked on the side nearest it, and furnished with flood-gates through which the salt water is occasionally admitted. The plants are usually gathered in September, and after they have been allowed to become heated by being thrown together in heaps, are dried in the sun. In October the plants are burned in a hemispherical kiln dug in the earth; and the soda contained in them is fused and collected in masses, which have a hard and spongy consistency and this, when broken into fragments, is ready for shipment. Sicily and Teneriffe both produce good barilla, but inferior to that of Alicante. The Saracens, on their establishment in Spain, were the first who introduced its manufacture into Europe. Carbonate of soda is used in the manufacture of soap and glass, and for other purposes; but the imports have greatly decreased of late years, in consequence of its being now produced, through the agency of sulphuric acid, from common salt.

BA'RIS is a genus of beetles belonging to the Curculionidae, a family of the RHYSOCHORONÆ. The species of this genus feed upon the dead parts of trees. One of the species, *Baris lignarius*, feeds upon the elm-tree, both in the larva state and in that of the perfect insect. When the little beetle is about to lay its eggs it generally selects the interior of a hollow tree for that purpose, and bores a hole with its short snout in the dead wood where it is still tolerably sound; this being accomplished it enters the hole hinder part first, deposits its eggs, and dies. The hole being only just the size of its cylindrical body, it thus forms a protection for its young by stopping the hole so that no other insect can enter. It is not known that it ever attacks any other wood but that part where the sap has ceased to flow, and consequently the tree can receive no injury from this little weevil.

BAR'TONE or **BAR'YTON**, the highest bass voice. Its derivation (Greek, "heavy tone") evidently intends that it should be regarded as a low tenor, but modern writers invariably treat it as a high bass. The part of Elijah is written for a baritone, in the oratorio of Mendelssohn bearing that name; and a glance at the music will show that all the effect would be lost if it were sung by a voice of tenor quality. The usual compass written for this voice is from C in the bass stave to *f*, an octave and a half above, occasionally touching the *g*. The French name for this voice is *basse chantante* or *basse taille*.

BARITONE is also the name of the saxhorn in B \flat or C, differing from the euphonium by its smaller bore and mouth-piece, and consequently of brighter quality.

BARIUM, a metal, symbol Ba; atomic weight, 137.0. It is the base of the earth baryta, from which it is obtained by passing potassium vapour over it at a red heat. It was first obtained by Davy in 1808 by the electrolysis of moistened carbonate of baryta in contact with mercury. It readily decomposes water at ordinary temperatures, forming a solution of hydrate of baryta, and it also oxidizes by simple exposure to the air. It fuses below red heat, and when heated in air burns with a deep red light. Barium forms two compounds with oxygen.

Baryta (BaO) is a gray powder, which slakes like lime when water is added to it, emitting heat and forming hydrate of baryta. It is soluble in water, but less so than potash or soda. It is caustic to the taste, and affects vegetable colours in the same manner as the alkalis. The *dioxide* (BaO_2) is prepared by raising baryta to a low red heat in an atmosphere of oxygen. Care must be taken not to raise the heat to full redness, or the second atom of oxygen will be given off again. If this oxide be dissolved in hydrochloric acid at a low temperature, baric chloride is formed, and hydrogen peroxide (H_2O_2) is produced at the same time.

Chloride of barium (BaCl_2) is obtained by dissolving native carbonate of baryta in pure hydrochloric acid diluted with three or four times its bulk of water. It crystallizes in white scales, which contain two atoms of water, and is much used as a test for sulphuric acid, with which baryta forms an insoluble *sulphate* (BaSO_4). This salt is found abundantly in a natural state, often in beautiful crystals, under the name of heavy spar. The sulphate, though insoluble, produces a sulphide, soluble in dilute acids, by subjecting it to an intense heat in contact with carbon, thus $\text{BaSO}_4 + 4\text{C} = \text{BaS} + 4\text{CO}$.

Baric carbonate (BaCO_3) is found native under the name of *witherite*. The native carbonate is not attacked by sulphuric acid, and retains its carbonic acid at very high temperatures. It is insoluble in water, but soluble, as above mentioned, in dilute acids. It is readily precipitated, in the form of a white powder, from a solution of baric chloride or nitrate by mixture with solution of sodic carbonate. It is a dense substance, its specific gravity being about 4.331, and is sometimes translucent and nearly colourless, but is often opaque. It sometimes occurs crystallized, and the primary form is a right rhombic prism, but it usually has the form of a six-sided prism. It is used for the purpose of dissolving in acids to produce barytic salts, and also for preparing baryta by heating with charcoal, especially when it is coated merely in aqueous solution. All the soluble salts of baryta are highly poisonous, the best antidote being Epsom salts.

BARK. Plants are clothed with a layer of protective cells, called the epidermis, which in woody parts is only found on the young branches. In older stems and branches cork-cells are produced at various points beneath the epidermis, increasing in number continually from the inside towards the circumference. When a complete layer is formed in this way it replaces the epidermis, and is known as the *periderm*. But in still older stems and branches, the cells forming cork arise even within the woody tissues, and by cutting off all tissues outside from nutrition, and thus killing them, they form the *bark*.

It is in bark that we find the essential principles of the oak, the larch, and other trees used by tanners; and of the cinnamon, the cinchona, and other aromatic or febrifugal species; and that we procure, by wounding it, such matters as resin and gum, which readily flow from incisions made in it. As all such secretions are formed in consequence of evaporation from the leaves, it would follow that the proper time for collecting them is at the period when the leaves have performed their office for the year, and all superfluity of moisture has been parted with: this period is winter, or the season of torpor. But, as at

that time the liber adheres firmly to the wood, the spring is more frequently chosen for barking; and theory would say that the proper time is just at the moment when the sap begins to be in motion, and the liber and sap to separate, and before the secretions have been diluted or dissolved by the ascent of fluid from the earth. But this will obviously depend upon the nature of the substance which is sought for; for example, the greatest quantity of tannin is found in the youngest liber; therefore bark for tanners' purposes should be stripped just before it begins to adhere to the wood after the leaves are fully formed, and when they are in full action; because at that time the whole of the liber which is formed during the year is developed, and few chemical changes have begun to take place in its constituent parts. Turpentine, again, will only flow in the summer; and therefore that which is to be obtained by a spontaneous emission must be sought for at that season.

Several kinds of bark are used for processes in the arts for medicines, and enter largely into commerce. Of the former class are oak bark, cork bark, mimosa or wattle bark, and quercitron bark; and the most important among the latter is Peruvian bark, obtained from the *Cinchona*. Some others, such as CINNAMON and CASSIA, will be found noticed elsewhere.

Oak bark is extensively, and was formerly almost exclusively, used in tanning, for which it is valuable on account of the large proportion which it contains of the peculiar astringent called *tannin*. Besides tannin, which unites with the skin to form an insoluble compound, bark contains another matter, called *extractive*, which confers upon skins their softness and durability. Galls do not contain so much extractive as bark, and are therefore not so valuable for tanning purposes. In estimating the relative value of barks, account should be taken of the amount of extractive as well as of tannin. Sir H. Davy showed that $8\frac{1}{2}$ lbs. of oak bark are equal in efficiency to 1 lb. of catechu, $2\frac{1}{4}$ lbs. of galls, 3 lbs. of sumach, $7\frac{1}{2}$ lbs. of the bark of the Leicester willow, 11 lbs. of the bark of the Spanish chestnut, 18 lbs. of elm bark, or 21 lbs. of common willow bark. The quantity of tannin, however, varies both with the age of the trees and with the season in which they are cut, being more abundant in the bark of young than of old trees; while if taken in the spring the bark has four and a half times the quantity, in a given weight, that it would have in the winter. For the mode of using oak bark, see our article **TANNING**.

Cork bark, or *cork*, is the outer bark of an evergreen oak (*Quercus suber*) which grows abundantly in Portugal, Spain, the south of France, and Italy. Most of the cork bark used in Europe is supplied by Spain and Portugal, but that of the best quality by France. As the cork is really dead bark, it may be carefully removed without injuring the tree, which may be stripped every eight or ten years, beginning when it is fifteen years old. At each successive stripping the produce becomes greater, and better in quality. The inner bark, which contains much tannin, cannot be removed without destroying the tree. Cork bark is usually charred lightly when taken from the tree, to improve the texture by closing the pores; but this process, which is liable to impart a disagreeable flavour to liquors stopped with cork so treated, is not required for the thinner but closer layers of young bark. The lightness of cork recommends its use as floats for fishing-nets, for life-preservers, for insuring the buoyancy of life-boats, and for similar purposes; while its compressibility and elasticity, being combined with closeness of pore, render it valuable for stopping bottles and casks.

The Greeks and Romans were both well acquainted with cork, and seem to have occasionally used it as stoppers for vessels, but it was not extensively employed for this purpose till the seventeenth century, when glass bottles—of which no mention is made before the fifteenth century—began to

be generally introduced. Cork-trees grow well in various parts of Algeria, and the French government encourages their cultivation.

Mimosa, or *wattle bark*, is collected from two species of *Mimosa*, which abound in New South Wales, Tasmania, and New Zealand, where it is employed in tanning. It contains about 150 lbs. of pure tannin in a ton of bark, and it imparts a reddish colour to the leather.

Quercitron bark is the produce of the *Quercus nigra* or *tinctoria*, or North American oak, and is used as a yellow dye. The colouring matter resides wholly in the inner bark; and care is needful in extracting it to avoid any admixture of the tannin of the bark, which would give a brown tinge.

BARK. See BARQUE.

BARK, PERUVIAN. See CINCHONA.

BAR'KAL, or **JE'BEL BAR'KAL**, an isolated sandstone rock in Nubia, about a mile from the right bank of the Nile, in 18° 31' N. lat., and 31° 46' E. lon. The rock rises abruptly on all sides, and quite perpendicularly on the side towards the river, to the height of nearly 400 feet, forming a wide plateau at the summit. Its circumference at the base is about twenty-five minutes' walk. The remains of several great temples lie between the mountain and the river. The most remarkable are that called the Typhonium, and the Great Temple. The Typhonium, the best preserved of all, was dedicated to Typhon, or the evil genius, as appears from several figures of Typhon still remaining. The temple is 108 feet in length; its entrance faces the S.S.E. The fore part of the temple is a regular construction; and the further or inner part is excavated in the rock itself. The Great Temple, one of the largest monuments in Nubia, is at some distance from the rock; it was entirely a constructed edifice, but the walls are now a heap of ruins, and the bases and fragments only of its seventy-eight pillars are discernible.

Before the northern entrance of a ruined building two lions of red granite were found, which are now in the British Museum. The material is a flesh-coloured granite; and the execution possesses a high degree of merit. Both of the lions are represented in a reclining posture, one lying on his right side and the other on the left.

BARK-BED, in horticulture, is a bed formed of the spent bark used by tanners, placed in the inside of a brick pit in a glazed house, constructed for forcing, or for the growth of tender plants. Gardeners use it for all plants which require what they call bottom heat, that is to say, for all species which are natives of tropical climates, and for pine-apples especially. In constructing a bark-bed the coarsest bark which can be obtained after the tanners have used it should be selected, because it is found that the slowness of the fermentation, and consequently the steadiness of the heat given off, is in proportion to the size of the fragments of bark employed; small tan, broken into minute pieces by machinery, although often the only material to be had, should consequently never be used if it can be avoided. After having been slightly dried by being spread in the sun the tan is first laid in heaps, covered with mats, until fermentation has commenced; it is then transferred to the brick pit, in which it is finally to remain. Having been lightly but evenly arranged in the pit, and the glass roof of the house having been closed, the tan is left to undergo fermentation—which at first is violent, evolving more heat than any plants could bear; but in a few days it subsides, and when the temperature of the bed has fallen to 96° it is in a proper state to receive the pots which are to be plunged in it. The heat will gradually but very slowly diminish to 60°, below which it is scarcely desirable, in the opinion of gardeners, that the tan should be retained; but the temperature may a second time be raised to 70° or 80° by turning the tan over, or fermentation may be further renewed by the addition of a small quantity of yeast.

BAR'KER'S MILL, a water-wheel invented towards

the close of the seventeenth century by Dr. Barker, of which the simplest form consists of a tube, the upper extremity of which carries a wheel capable of setting in motion the machinery required when the tube rotates. The lower extremity of the tube turns upon a pivot. Two arms project from the tube near the bottom, and the further end of each arm is pierced by a hole, both holes facing in the same direction of rotation. On water being admitted into the tube it gushes out at the hole in each arm and forms a pool, the reaction caused by the continued rush of the two streams imparting a rotatory movement to the central tube. This simple form is of but little use in practice, but modified forms of it, such as "Whitelaw's," which has three curved arms and an improved method of admitting the water, have been found to give satisfactory results, and are coming more generally into use. Many engineers claim for these improved forms of Barker's mill that they give the greatest power obtainable from a small stream of water. It is evident that with a larger stream of water the undershot-wheel is a better contrivance.

It is a little difficult to explain briefly the action of Barker's mill; but a good general idea may be formed of it without going into details by considering the internal pressure of the water upon the arms, which is, of course, great in proportion to the length of the column of water in the central tube, and to the leverage (that is, the length) of the arms themselves. Now, suppose one arm to be suddenly pierced at its extremity, then that pressure would be released, and consequently the internal pressure of the water on the other arm, having nothing to counterbalance it, would whirl the machine round by the leverage it now exerts in the direction opposed to that of the hole. It is now easy to see that if the second arm be also pierced on the opposite side to the motion of rotation (that is, upon the same relative side as the first arm), this will intensify the action thus begun; and a third arm similarly pierced (as in Whitelaw's machine) will give still greater power. The machine therefore seems to the eye to be driven backwards by the rushing streams, and indeed is really assisted somewhat by the shock of the streams against the atmosphere. It is found that curved arms increase the action of the mill.

BARK'ING, a market-town in Essex, is situated on the eastern bank of the Roding, about 2 miles from the Thames, and 7 miles E. from London on the railway to Southend. The town formerly derived its importance from Barking Abbey, a rich conventual establishment of nuns, who were governed by an abbess, who was one of the four who were baronesses in right of their station. The abbey was surrendered to Henry VIII. in 1539, and the abbess and nuns, of whom there were about thirty, received pensions. Hardly any portions of the conventual buildings remain, except the Church of St. Margaret, which belonged to the abbey, and contains some curious monuments. There are places of worship for all denominations of dissenters. The Roding is wide up to Barking, and is called Barking Creek, the tide flowing up from the Thames. On the east side of the creek are a number of chemical and artificial manure works; and on the west the extensive outfall works of the metropolitan main drainage, which are of the most elaborate and costly character, and include a brick reservoir 10 acres in area and 10 feet deep. At Beekton, near Barking Creek, are the works of the Chartered Gas Company, covering 150 acres of ground, and capable of producing 10,000,000 feet of gas daily. Above Barking the Roding becomes narrower, but has been made navigable for small craft as far as Ilford. Many of the inhabitants are fishermen, or are employed in conveying by water coals and other necessities from London for the supply of Barking and other places in the neighbourhood. Population of the parish in 1881, 16,848.

BARKING STOE is 5 miles from the town. It contains a modern church, and is a separate ecclesiastical district. The famous Fairlop fair was formerly held here on the

first Friday in July. The hollow trunk of Fairlop Oak, which in Gilpin's time overshadowed a space of 300 ft. in circumference, was burned accidentally by a picnic party.

A large portion of Hainault Forest was in the manor and parish of Barking. It belonged to the crown, and was disafforested in 1851, the trees, about 100,000 in number, being felled, and the ground drained and laid out in farms.

BAR'LAAM AND JOS'APHAT, the names of two saints in the Greek and Roman martyrology, whose history forms one of the most widespread religious legends of the middle ages. It is generally attributed to St. John of Damascus, though this authorship is disputed by some historians, who attribute it to the church historian, Anastasius Bibliothecarius, or regard it as the work of some unknown Eastern or Ethiopian Christian. It was included by Simon the Metaphrast in his compilation of the "Lives of the Saints," and became so popular that it was translated in Europe into the French, German, Italian, Spanish, Bohemian, Polish, Swedish, Norwegian, and Icelandic languages, and in the East into Arabic, Ethiopic, Armenian, and Hebrew. It has even been rendered into the Tagala language of the Philippines, where an edition of the story was printed at Manila in 1712. Considerable attention has been directed to the story of late years from the discovery by Dr. Felix Liebrecht, in 1860, that it is merely a Christianized version of the story of Buddha, the whole outline and many of the episodes being clearly traced to Buddhist sources. This discovery has been confirmed by the later researches of Sanskrit scholars, which have all tended to show that the original story follows most closely the Sanskrit narrative of the life of Buddha. An interesting field of research has thus been opened up, and the curious fact revealed that Sakya Muni, the founder of Buddhism, has, under the name of St. Josaphat, for many centuries been revered as a saint by the Christian Church. His day in the calendar of the Greek Church is the 26th August, and in the Roman Church 27th November.

BAR-LE-DUC or **BAR-SUR-ORNAIN**, the capital formerly of the duchy of Bar, now of the department of Meuse, in France, stands on the Ornaïn, a feeder of the Marne, at a distance of 125 miles east of Paris, and had 15,700 inhabitants in 1882. Bar is divided into an upper and a lower town. The upper town stands on a hill above the Ornaïn; it is the most ancient part of Bar, and is well built. Very little business is done in it, but the view from it is very fine. In this part stood the old fortress of the dukes of Lorraine, to the foundation of which, in the tenth century, Bar is said to owe its origin. It was demolished by Louis XIV. The Church of St. Pierre contains a monument of René de Châlons, prince of Orange, on which is a remarkable piece of sculpture, representing a body in a state of decomposition. The lower town stretches along the Ornaïn, which is crossed by three stone bridges. The chief business of Bar is carried on in this part; it contains many factories, dye-houses, and workshops. The streets are wide and well laid out; some of them are adorned with double rows of linden-trees. Before the Revolution Bar contained a great number of churches and religious houses. Of the churches that remain the principal are those of St. Etienne and Notre Dame; the other public buildings are of a very ordinary character. Bar possesses tribunals of first instance and of commerce, a college, and a public library. Its manufactures consist of cotton and woollen goods, cotton yarn, hosiery, handkerchiefs, and leather. The town is celebrated for its sweetmeats, and contains several breweries. The Ornaïn is navigable below Bar, which has thus a ready means of transit for its industrial products, and for the other items of its trade, namely, wine, iron, fir and oak planks, and firewood for the supply of Paris. There are extensive iron-works and stone-quarries in the neighbourhood. The railway from Paris to Strasburg passes through Bar-le-Duc.

BARLETTA (the ancient *Bardulum*, and called in the middle ages *Barolum*), an important seaport town in the province of Bari, in Italy, is picturesquely situated on the Adriatic, on the railway from Ancona to Brindisi. The town is well built, and the streets are wide and well paved. The harbour is protected by a mole and by a small island, on which a lighthouse is built; it is frequented by vessels of small burden, not having depth enough for large ships. In one of the principal streets, near the Church of St. Stephen, is a colossal bronze statue, 17 feet high, said to be that of the Emperor Heraclius. Some art critics, however, pronounce it to be a statue of Theodosius. The cathedral of Barletta is a Gothic building, with a high steeple; in the interior are some ancient granite pillars brought from Canosa. A citadel commands the harbour. Barletta is a thriving place, and one of the most pleasant provincial towns of the kingdom. It is much frequented by Dalmatian traders, and also has an important commerce with Greece and the Ionian Islands in corn, salt, wool, lamb and kid skins, and other produce. The population in 1882 was 33,120.

BARLEY (*Hordeum*), a grain too generally known to require minute description. It is readily distinguished from other grain by its pointed extremities, and by the rough appearance of its chaff-scales.

Of all the cultivated grains barley is perhaps that which comes to perfection in the greatest variety of climates, and is consequently found over the greatest extent of the habitable world. It bears the heat and drought of tropical regions, and ripens in the short summers of those which verge on the frigid zone. In genial climates, such as Egypt, Barbary, and the south of Spain, two crops of barley may be reaped in the same year, the one in spring from seed sown the preceding autumn, and the other in autumn from a spring sowing.

Agricultural writers in general have distinguished the different species of barley, either from the time of sowing them, into winter barley and spring barley; or, from the number of rows of grains in the ears, into six-rowed, four-rowed, and two-rowed or flat barley. Another distinction may be made, between those which have the chaff-scale strongly adhering to the seed, and those in which they separate from it, leaving the seed naked—from which circumstance these are called naked barleys. Those kinds which are hardier, and will bear the winters of our climate, may also with success be sown in spring, as is the case with the Scotch bere or bigg.

Winter barley is mostly sown in those countries where the winters are mild and the springs dry, as in the south of France, Italy, and Spain, or in those where the snow lies deep all the winter, and where the sun is powerful immediately after the melting of the snow in spring, as is the case in parts of Russia, Poland, and some parts of North America. In most climates where the winter consists of alternate frost and thaws, and the early part of spring is usually wet, as is the case in England, Scotland, and Ireland, the young barley is too apt to suffer from these vicissitudes, and the spring-sown barley gives the more certain prospect of a good crop; but the grain of the latter is seldom so heavy as that which has stood the winter, and being harvested later it interferes with the wheat harvest.

The winter-sown barley is generally of the six-rowed sort, of which the bere or bigg is an inferior variety; but being hardy, and of rapid growth, it is well suited to exposed situations and inferior soils. The Siberian barley, a variety of which, with naked seeds, has been highly extolled by foreign agricultural writers, especially by Thuer, under the name of *Hordeum celeste*, seems to be a superior sort in rich soils, not only for its heavy and nutritious grain, in which particulars it is said to approach to the quality of rye, but also for its succulent stems and leaves, which make it by far the best sort to sow for the purpose of green food for cattle and sheep; and if fed off early the roots will, in

a rich soil, shoot out an abundance of fresh stems, and produce a good crop of grain at harvest.

The barley most commonly cultivated in England is that which has only two rows. It is almost universally sown in spring. The varieties produced by difference of soil and cultivation, as well as by seed occasionally brought from other countries, are innumerable. In light soils, barley should be sown after turnips that have been consumed by sheep-folding, and by this means a good supply of manure is procured. The quantity of barley sown is from $2\frac{1}{2}$ to 3 bushels, and one-third less if sown by the drilling machine.

The proper time for sowing barley depends much on the season and the state of the land. The best practical rule is, to sow as soon after the middle of March as the ground is dry. Earlier sowings may sometimes succeed well, but in this climate cold wet weather often prevails in the end of February and beginning of March, and this is by no means favourable to young plants of barley. The early-sown crops are, however, in general the heaviest, especially the sorts which ripen later; they require less seed, having more time to tiller before the hot weather draws up the stems. There are, however, seasons when the later-sown crops are the best. A good rule is, to sow a quick-growing sort when the sowing is unavoidably deferred, and in this case more seed must also be allowed.

The depth at which the seed should be deposited depends on the nature of the soil and on the season. Winter barley need only be slightly covered, and will tiller astonishingly in good light soils. As a general rule, a depth of from $1\frac{1}{2}$ to 3 inches, according to the nature of the soil, is most likely to enable the seed to sprout well, and give a sufficient hold of the land by the roots to avoid the danger of lodging. It is of consequence that all the seeds be deposited at a uniform depth, to insure their shoots rising at the same time: for where some rise earlier and some later it is impossible to reap the whole in good order; some of the ears will be too green, while others are shedding the seed from being too ripe. This is one reason why the drilled crops are, in general, so much more regular in their growth than the broadcast. After sowing barley it is useful to pass a light roller over the land, across the stiches, if there are any, to press the earth on the seed, and prevent too great evaporation of the moisture. When the plants begin to tiller, another rolling, and in some cases a slight harrowing, to loosen the surface and thin out the plants where they grow too close, is very useful. This also is the best time to sow clover and grass seeds, if not done with the first rolling. This practice of sowing clover, rye grass, or other seeds with the barley is almost universal, and is considered as one of the great modern improvements in the science of agriculture.

The diseases to which barley is subject while growing are those which attack all other grain—the smut, the burnt ear, blight, and mildew; but it is less liable to these than wheat. The greatest enemy is a wet harvest. It is so apt to germinate with the least continuance of moisture, that even before it is reaped it often exhibits an ear in full vegetation, every grain having sprouted. It is then of little value, and even when this is checked by dry weather, or in the kiln, the grain is so impaired as to be fit only to feed fowls and pigs.

The principal use of barley in this country, and wherever the climate does not permit the vine to thrive, and no wine is made, is to convert it into malt for brewing and distilling. The best and heaviest grain is chosen for this purpose. The produce varies, according to the soil, preparation, season, &c., from about 20 to 60 or 70 bushels an acre. The most usual crop is from 28 to 36 or 38 bushels. A bushel of good English barley generally weighs about 55 lbs., but the best sometimes weighs 57 or 58 lbs. It is said to contain 65 per cent. of nutritive matter; wheat contains 78 per cent. A bushel of barley weighing 50 lbs.

will therefore contain about 32 lbs. of nutriment, while a bushel of wheat weighing 60 lbs. contains 47 lbs. Barley has always been considered as possessing medicinal virtue; decoctions of it have long been used for the sick, especially in all pulmonary complaints.

In 1884 there were 2,346,041 acres under cultivation with barley in the United Kingdom—1,808,408 in England, 129,858 in Wales, 230,554 in Scotland, and 167,346 in Ireland. The imports of barley into the United Kingdom in 1884—chiefly from Russia, France, Denmark, Germany, and Turkey—amounted to 12,987,293 cwt.: value, £1,228,722.

PEARL BARLEY is the small round kernel which remains after the skin and a considerable portion of the barley have been ground off. Barley from which only the outer husk or skin has been removed is called *pot* or *Scotch barley*.

Pot and pearl barley are very wholesome and nutritious, and it is to be regretted that they are not more used as food by the labouring classes in England, as they are in Scotland, Germany, and Holland. The essential oil of barley, which gives it its peculiar taste, resides chiefly in the skin and adjacent parts of the grain; the interior is a purer farina, more nearly resembling that of wheat. This farina, obtained by grinding pearl barley in a common mill, is called patent barley, and used extensively for making barley-water; but if the essential oil possesses any medicinal properties, it is evident that common pot barley would be preferable for making a decoction of barley when prescribed as a remedy. The great use of pot and pearl barley is in broths, stews, and puddings, as a substitute for rice. It swells, and unites well with the fat and oily matter extracted from meat in boiling. Even the bran, having been steeped in water, and allowed to ferment till it becomes acid, is relished by the lower orders in the mess called *soecans*. In Holland, pot barley boiled in butter-milk is very often used as a nourishing food for children.

De Candolle, in "L'Origine des Plantes cultivées" (1883), considers that the native country of *Hordeum distichon* lies between the Red Sea, the Caucasus, and the Caspian Sea, where it is found wild at the present day. This (the two-ranked) barley is found amongst the remains of the Swiss Lake-dwellings, and its cultivation therefore dates from the Stone Age. Common barley (*Hordeum vulgare*) is mentioned by Theophrastus, but does not seem to have been cultivated to such an extent as either the two-ranked or six-ranked barley. The latter (*Hordeum hexastichon*) was the most commonly grown by the ancients, but neither this form nor the common barley are known in a wild state. Six-ranked barley is figured on the most ancient monuments of Egypt, it was cultivated by prehistoric man before he had any knowledge of metals, and Heer has distinguished two varieties as cultivated by the Lake-dwellers, one of which is figured on a medal of South Italy dating from the sixth century before the Christian era.

BARLEY-BREAK, a very famous game in Elizabethan times, often mentioned by Shakspeare, described so fully by Sir Philip Sidney in "Arcadia," that to quote his fine lines will be the best way of representing it:—

"Then couples three be straight allotted there,
They of both ends the middle-two do fly;
The two that in mid space (Hell, called) were
Must strive with waiting foot and watching eye
To catch of them, and them to Hell to bear.
That they, as well as they, may Hell supply,
Like some that seek to save their blotted name,
Will others blot till all do taste of shame.
"There you may see, soon as the middle-two
Do, coupled, towards either couple make.
They, false and fearful, do their hands undo;
Brother his brother, friend doth friend forsake,
Hedding himself cares not how Fellow do,
But if a stranger mutual help doth take;
As perjured cowards in adversity
With sight of fear from friends to friends do fly."

The denizens of "Hell" dare not loose hands, but the other couples had this freedom, under restrictions. The penalty of being caught was a kiss, whence Herrick's epigram on the game:—

"We two are lost in Hell: what may we fear
To be tormented, or kept prisoners here:
Alas! if kissing be of plague the worst,
We'll wish in Hell we had been lost and first."

There is a pretty poem by Sir John Suckling punning on the word Hell, as used in barley-break, after the same fashion as Herrick, each stanza ending with the refrain

"Love and Folly were in Hell."

The derivation of the name of the game is quite unknown, for the random guesses that it was played "among stacks of barley in a farm yard," and that it should be "parley-break," because the chasing for prisoners began at the close of a certain cry, are manifestly of the usual "popular-etymology" order, without further authority than the fancy of the amateur philologist.

BARM. See YEAST.

BARMECIDES, or Children of Barnek, a noted family of Khorasan, devoted to the Abasside caliphs. Khaleed ben Barnek, the first historical member of the family, was tutor to the celebrated Haroun al Raschid. They became victims, however, to the jealousy and fear of the caliph in 802, who beheaded the son of Khaleed, imprisoned every other member of the family, confiscated all their property, and forbade even their name to be mentioned under penalty of death. The famous story of the feast in the "Arabian Nights," to which the barber's sixth brother, Scheenabae, was invited, and in which he was served only with imaginary viands, is attributed to one of the Barnevides.

BAR MEN, a town situated in the valley of Barmen, in Rhenish Prussia, 25 miles N.E. of Cologne. The valley extends about 5 miles along both banks of the Wupper, between two ranges of hills which run eastwards from Elberfeld, and are about a mile and a half apart. It is literally studded with cloth factories, cotton and silk mills (it is the principal continental seat of the ribbon manufacture), bleaching establishments, dye-houses, soaperies, tobacco factories, potteries, warehouses, and a variety of other buildings for the manufacture of linen, ironmongery, metal and plated goods, chemical products, &c. In the valley stand the large villages of Rittershausen, Wichlinghausen, Wupperfeld, Gemark, and Barmen. These have been incorporated into one town under the name of Barmen. The united population in 1882 was 95,941. Barmen is 20 miles E. of Düsseldorf, and stands on the railway between Minden and Aix-la-Chapelle, which passes through the government of Düsseldorf.

BAR MOUTH (or *Aberynau* or *Llanaber*), a small town and seaport in North Wales, in the county of Merioneth, 8 miles W. by S. from Dolgelly, is situated on the north side of the estuary of the river May, or Mawddach, at the foot of a lofty mountain. The houses rise in a succession of terraces, which communicate by flights of steps, and are sheltered on the N. and E. by other mountains. The whole place thus has a singularly romantic appearance, and it is much resorted to in summer for sea-bathing. Cader Idris is opposite Barmouth, and the scenery the whole way to Dolgelly is amongst the finest in Wales. The population in 1881 was 1512.

BARN. See AGRICULTURE.

BAR NABAS, ST., though not of the number of the twelve chosen by Jesus Christ, is nevertheless styled an apostle by the primitive fathers, as well as by St. Luke, to whom that portion of the Scriptures called the "Acts of the Apostles" is ascribed (Acts xiv. 14). Barnabas' divine vocation, and the share he took in the apostolic labours, obtained him this title. From St. Luke also we

learn (Acts iv. 36) that he was by descent a Levite of the country of Cyprus, then largely inhabited by Jews, and that his first name was Joses or Joseph. He received that of Barnabas (meaning "the son of consolation") from the apostles, as appropriate to his character for pre-eminence in works of charity. The "Laudatio S. Barnabae Apostoli," by Alexander, a monk of Cyprus, says that his parents brought him in his youth to Jerusalem, to Gamaliel, by whom he was instructed in the law and prophets with St. Paul. (See also Baronii, "Annal." ad ann. xxxiv.) There is at least probability in this, as he was the person to whom St. Paul applied, shortly after his conversion, to introduce him to the society of the apostles. The first mention of Barnabas in Scripture is in one of the passages already quoted, where (Acts iv. 34) it is related that the primitive converts at Jerusalem lived in common, and that as many as were owners of lands or houses sold them, and brought the price and laid it at the apostles' feet, on which occasion, with the exception of Ananias (who is spoken of in the next chapter), no one is particularly mentioned but Barnabas. Barnabas afterwards preached the gospel in different parts, together with St. Paul (Acts xv. 36); but upon a discussion about the person who was to accompany them in a journey which they proposed to the churches of Asia, which they had planted, they separated from each other. Barnabas went with Mark (the person about whom the dispute originated) to Cyprus, and Paul went with Silas to Cilicia. What became of Barnabas after this, or whether he went, is uncertain. It is said that he was slain by the Cypriot Jews, A.D. 61.

There is still extant an epistle ascribed to St. Barnabas, consisting of two parts. The first is an exhortation and argument to constancy in the belief and profession of the Christian doctrine, particularly the simplicity of it, without the rites of the Jewish law. The second part contains moral instructions. This epistle was written in Greek, but no complete MS. in this language was known until the discovery of the famous Sinaitic MSS. by Dr. Tischendorf. A translation from the Latin was made by Archbishop Wake, which has several times been printed. In this pistle there is no express mention of any book of the New Testament; but there is a text or two of the New Testament in it, with a mark of quotation prefixed; and the words of several other texts are applied. From one passage it seems evident that the Temple of Jerusalem was destroyed at the time of writing it. On these and other accounts the best critical authorities dispute its authenticity.

BAR NACLE (*Lepas*) is a sea-animal which belongs to the same class (*CRUSTACEA*) as the crab, lobster, shrimp, and crayfish; and to the same division (*CRUSTACEA*) of this class as *BAIANUS* (the acorn-shell). The scientific facts of the barnacle's life-history are much more wonderful than the curious assertions advanced in the myth noticed in the next article. The *nauplius*—as the immature form is called—on emerging from the egg, has a pear-shaped body without segments, three pairs of jointed legs, a dorsal shield, and a simple eye in the front of the head. In the next stage are found two eyes, still simple, but further back. In the third stage the dorsal shield becomes a bivalve shell; the eyes are now large and compound, the front limbs become prehensile antennae, the other limbs are cast off, and six pairs of feet are assumed, by means of which the animal jerks its way through the water. Finally, it abandons its vagabond life and fixes itself by its antennae to rocks, ships, floating wood, turtles, and even whales. The anterior part of the animal has now become a *peduncle* or "stalk," and firmly adheres to the foreign body by means of a secretion from cement glands which run down from the stomach to the antennae. These latter now become atrophied, and the eyes have again advanced and become simple and minute. The six pairs of feet are converted into *cirri*, which are long curling arms, fringed with hairs. These waft the food,

consisting of small crustaceans, towards the month. The bivalve shell is cast off and the *capitulum* assumed. It is composed of calcareous plates, usually five in number, and contains the body, covered by a loose membranous "sac" that aids respiration. The peduncle is flesh-coloured and flexible. No salivary glands are present. The barnacle grows very rapidly, and moults frequently. The cement-glands have been shown by Darwin to be a modified portion of the ovarian tube. The barnacles are hermaphrodite; that is, male and female are united in the same individual. In some species, however, of the barnacle family, *Hepadidae*, the hermaphrodite animal has attached to the shell several parasitic males, which Darwin has called "complemental" males, "to signify that they are complementary to an hermaphrodite, and that they do not pair like ordinary males with simple females." The barnacles have a world-wide distribution, but the greater number inhabit the warmer temperate and tropical seas. See *PLATE CHITURDIA*. ("A Monograph on the Subclass Cirripedia," by Charles Darwin, Ray Society, London, 1851.)

BARNACLE GOOSE or **BERNICLE GOOSE** (*Anser bernicula*) is chiefly remarkable for having been for centuries the reputed offspring of "certain shell-fishes of a white colour tending to russet," that is, of the BARNACLE. Despite the contradiction of such men as Albertus Magnus and Roger Bacon, this remarkable freak of nature was firmly believed in even by the learned. So much was this the case that the priests allowed barnacle geese to be eaten in Lent, considering them fish, not fowl. Even Linnæus, as Max Müller points out, seems to have given countenance to it by giving the crustacean the specific name *anatifera* or duck-bearing. It is conjectured that the myth arose through confusion of names. The geese were probably called *Hibernicula*, because caught in Ireland. By a process by no means uncommon the first syllable would drop off, leaving *Bernicula*, which is close enough to *Barnacula*, the name of the shell, to lead to confusion in the unscientific days of the thirteenth century. Fulgوس affirmed that certain trees resembling willows in one of the Orkneys, Pomona, produced at the ends of their branches small swelled balls, containing the embryo of a duck suspended by the bill, which when ripe fell off into the sea, and took wing. Munster, Saxo Grammaticus, Sealiger, Bishop Leslie, Olms Magnus, and other learned writers, attested the truth of this monstrous generation. Another modification of the story is that given by Boëce, the oldest Scottish historian, and confirmed by Gerard in his "Herbal" (1636), namely, that the bird in question is produced by a transformation of the barnacle, so often found adhering to floating blocks of wood, to piles, and the hulls of vessels. This transformation Gerard states that "his eyes have seen." Sir John Mandeville, in his account of his travels, caps a story told him of knabs growing on trees in Cathay by the story of the barnacle—"For I tolde hem," writes the worthy knight, "that in oure contree weren trees, that bare a fruyt, that becomen briddes fleying; and tho that fellen in the water, lyven; and thei that fallen on the erthe, dyen anon: and thei be right gode to mannes mete." In the "Ornithologia" of Ray and Willughby, which was published in 1678, the absurdity of the errors of former writers is demonstrated, and the doctrine of spontaneous generation (for these very barnacles were said to be bred out of sea froth and spume) is ably refuted. The author justly observes that "these geese do lay eggs after the manner of other birds, set on them, and hatch their young, as the Hollanders in their northern voyages affirm themselves to have found by experience." The whole story is given at length in Max Müller's "Lectures on the Science of Language."

The weight of the barnacle goose is about 5 lbs., the length rather more than 2 feet, and the expanse of wings about 4½. The bill, about an inch and a half long, is black,

with a reddish streak on each side; and between it and the eyes is a small black streak. The head, except the crown, is white; the crown, neck, and shoulders black. The upper parts of the plumage are marbled with blue, gray, black, and white; the under parts and tail coverts are white; the tail is black; the flanks are ashy gray; and the legs dusky. Like the rest of its genus this species is very shy and wary. The flesh is excellent. The barnacle goose is a winter visitant to our island and the temperate regions of Europe, Asia, and America. It breeds in the high northern latitudes, as Iceland, Spitzbergen, Greenland, Lapland, the north of Russia, of Asia, and of America, and consequently is migratory in its habits.

BARNARD CASTLE, a market and manufacturing town of Durham, is situated on the north-eastern bank of the Tees, on an acclivity which rises rapidly from the river, 23 miles S.W. from Durham, and 246 from London by the Great Northern Railway. The town derives its name from a large castle, the remains of which extend over upwards of 6 acres. During a rebellion in the time of Elizabeth it was taken by the insurgents, after a stubborn defence by Sir George Bowes of Streatham. Portions of the walls exist, and a large circular tower which stands on a particular cliff 100 feet above the river. It was built by Barnard, the grandfather of John Balliol, king of Scotland. The latter, who was a native of the town, founded an hospital for poor persons in 1229, which still exists. The town consists of a main street, about a mile in length, with a number of smaller ones branching off on each side. The town has a very cheerful appearance, as the houses are nearly all built of white freestone. The church is an ancient structure, restored in 1871. The town-hall was erected in 1747. The town formerly had some manufactures of carpets, but this branch of trade is now almost extinct, and the chief occupations are the manufacture of flax and shoemakers' thread. A very large corn market is held on Wednesdays. In 1874 the town received a magnificent donation in the shape of a superb mansion and museum, erected for Mrs. Bowes (the Countess of Montalba, and a descendant of the defender of the castle in the reign of Elizabeth), with the extensive collection of paintings, sculpture, and other works of art contained in the galleries. Barnard Castle is the scene of part of Sir Walter Scott's poem of "Rokeby." The population in 1881 was 4269.

BARNAUL, an important town in the government of Tomsk in Western Siberia, at the junction of the Barnaulka with the Obi. It is situated in a wide plain, which is bounded by offshoots of the Altai Mountains. It is the centre of a district as large as Hungary, rich in mines of copper, iron, lead, and silver, and has several smelting furnaces. The town also contains glass-works and a mint, and there are a mining school, library, museum, and an observatory. The population is 14,000.

BARNAVE, ANTOINE PIERRE JOSEPH MARIE, a distinguished orator and victim of the French Revolution, was born at Grenoble, 22nd October, 1761. His father was an advocate, and he followed the same profession, in which he soon distinguished himself. A pamphlet of a liberal tendency, which he published in 1788, led to his election in the following year to the States-general as deputy for his native province. His eloquence and ability soon brought him to the front; as the pithy epigram ran at the time—"Whatsoever the three have in hand, Duport thinks it, Barnave speaks it, Lameth does it;" and it was largely owing to his strenuous efforts that the restoration of the property held by the church to the use of the nation, the abolition of the crowded and idle religious orders, the emancipation of the Jews, and the liberation of the slaves in the French colonies were carried out. When Mirabeau began his intrigues with the court party (and perhaps, though it certainly was a piece of treachery, Mirabeau showed his statesmanship in thus endeavouring

to reform, instead of subvert, the old form of government) Barnave separated from him, and when the question as to the right of making peace or war arose, Barnave, who maintained that this power ought to rest for the future with the Assembly, was triumphant against Mirabeau's more constitutional views. He was one of the original members of the famous Jacobin Club, and was called in 1790 to the post of president of the Assembly. When Louis XVI., having attempted flight, was arrested at Varennes, Barnave was sent with Latour-Maubourg and Pétion to bring him back. During this journey the misfortunes of the royal family and the dangers awaiting them produced a great impression upon him, as he already saw the abyss into which the Revolution was plunging, and he determined to do all that lay in his power on their behalf, thus reverting to the policy he had formerly opposed in the great Mirabeau. He defended the inviolability of the king's person in a speech of great power and earnestness, but came in consequence under suspicion, and was accused of being a renegade by the party of the extreme left. On the dissolution of the Assembly in 1792 he retired to his native place, married a wealthy heiress, and settled down quietly; but was thrown into prison in the month of August the same year, on the discovery of his correspondence with the queen, part of the contents of the famous iron press—*l'armoire de fer*—so fatal to many men. In November, 1793, he was brought before the revolutionary tribunal at Paris, and, despite a most eloquent defence, he was condemned and guillotined on 29th November, 1793—aged but two-and-thirty, and having passed through what vicissitudes! On the scaffold he stamped his foot, and looking upward cried, "This, then, is my reward!"

BARNES, a parish in Surrey, between Putney and Mortlake, 8 miles S.W. by W. from Westminster Bridge, is situated on the east bank of the Thames, and has a station on the London and South-western Railway, whose line here crosses the river. Barnes Common is 120 acres in extent, and is one of the best kept around London. It is also very near Putney Heath and Wimbledon Common, so that the extent of open ground in the immediate neighbourhood is very large. Numerous elegant mansions and villas have been erected of late years in this pleasant neighbourhood. Barn Elms was the site of the house in which Sir Francis Walsingham entertained Queen Elizabeth, Cowley the poet resided, and the Kit-cat Club held its meetings. Fielding the novelist lived in Milbourne House on Barnes Common. The population in 1881 was 6001.

BAR'NET (called also *Chipping Barnet* and *High Barnet*), a market-town in Hertfordshire, is about 18 miles N.W. from Hertford, and 10 from London by the Great Northern Railway. The town stands on a hill on the line of the old main road from London to the north. It formerly belonged to the Abbot of St. Albans, to whom the market was granted in the reign of Henry II. Barnet has much improved in recent years, and such a large number of new houses have been built in the vicinity of the railway station as to form almost a separate town, known as New Barnet. The parish church was erected in 1400 by John Mort, bishop of St. Albans. It contains many ancient monuments. There is a new church, a large Roman Catholic chapel, places of worship for dissenters, and some good schools and benevolent institutions. Queen Elizabeth's school, founded in 1573, but which had fallen into a sad state of neglect and uselessness, was rebuilt in 1875, and is now conducted on entirely modern principles. It has accommodation for 250 boys, of whom 10 per cent. can earn exemption from all fees, and 5 per cent. from half fees, in the form of exhibitions. In 1471 the decisive battle of Barnet was fought on Gladsmore Heath, near the town, between the York and Lancastrian forces, when the latter were defeated, and their leader, the Earl of Warwick,

was killed. An obelisk has been erected in commemoration of this event. The population of Barnet in 1881 was 4095.

BAR'NEVELDT, JAN VAN OLDEN, was born at Amersfoort, in the province of Utrecht, in 1547, of an ancient and noble family. In 1564 he went to the Hague to prosecute his studies as an advocate. His practice soon became considerable; he was appointed one of the advocates of the court, and in 1576 was chosen councillor and pensionary of Rotterdam.

While the struggle between the Netherlands and Philip II. was at its height, Barneveldt, who was early distinguished for his patriotic ardour and impatience of the yoke of Spain, did not let either his advocate's gown or his habits as a civilian prevent him from occasionally discharging the duties of a soldier. In 1573 he assisted as a volunteer at the memorable siege of Haarlem, and was only prevented by illness from taking part in the still more memorable siege of Leyden, in 1575.

In 1585 the prospects of the United Provinces were most disheartening. William the Silent had fallen by the hand of an assassin on the 10th of July in the preceding year. The Spanish arms, directed by the Prince of Parma, were almost everywhere triumphant, and it appeared hopeless to continue the struggle without the aid of foreign powers. Under these circumstances the States-general opened negotiations with France and England, from whom they had received promises of assistance. Henry III. was too much engaged with the war of religious factions which then distracted his own kingdom to aid the insurgents, and accordingly on the 29th of June, 1585, a deputation, headed by Barneveldt, made a formal offer of the sovereignty of the revolted provinces to Elizabeth, who refused the proffered sovereignty, but entered into a treaty, by which she bound herself to aid them with 5000 foot and 1000 horse, advancing at the same time a considerable sum of money, to be repaid at the end of the war. The command of these troops was intrusted to Elizabeth's favourite, Dudley, earl of Leicester; but he was unsuccessful, soon became unpopular, and was ultimately recalled. In all the events of this period Barneveldt, who now held the office of advocate-general or grand-pensionary, had a large share.

In 1603 the States-general despatched an embassy to England, nominally to congratulate James I. on his accession, but in reality to prevent his concluding a treaty of peace with Spain. The conduct of the embassy was trusted to the sagacity and experience of Barneveldt. No ordinary address and perseverance were required to overcome the feelings which James entertained towards men whom he did not hesitate to denounce as rebels against their lawful king. Barneveldt was, however, supported by the Duke de Sully, the French ambassador, and the result of these negotiations was that James attached his signature to a treaty drawn up by Sully, which bound the kings of France and England to aid the States by a secret advance of money, to be followed up by actual hostilities against the Spanish king if he should resent this clandestine assistance.

The truce of twelve years between Spain and the United Provinces, signed on the 9th of April, 1609, was effected almost entirely through the influence and firmness of Barneveldt, which exposed him to unworthy suspicions.

A struggle now commenced between the war and the peace party—the contest, in fact, of the civil power with the military—between Maurice the stadtholder and commander-in-chief, and Barneveldt the grand-pensionary, in which the religious feelings of the Arminians, to whom Barneveldt adhered, and the Calvinists, who were favoured by Maurice, became also strongly excited.

It is not necessary to detail the steps by which Maurice of Nassau, after a struggle of ten years, triumphed over Barneveldt and the States, and usurped the sovereign power. Barneveldt was denounced by Maurice's party as

one who had sold himself and country to Spain and popery; and, as he had openly espoused the doctrines of Arminius, he was denounced by the Calvinist preachers as leagued with the Catholic monarch in his designs against the Protestant worship. The question upon which the great struggle between Barneveldt and the stadtholder finally turned was the calling a national synod, to which the point at issue between the Arminians and the Gomarites should be referred. This Barneveldt opposed; confusions and tumult ensued, and he called upon Maurice, as the commander of the military force, to aid the civil authorities in suppressing them; but Maurice encouraged the confusion, and the Arminians were everywhere assaulted and persecuted. In this embarrassment Barneveldt formed a militia, composed of the citizens, in Arnhem, Leyden, and Utrecht. This body was called by the Dutch name of Waartgelders. Maurice immediately marched his army against the militia, disarmed them, took possession of the Arminian towns, deposed the Arminian magistrates, and openly assumed absolute authority. The States-general, overawed by his boldness, and jealous of the fame and influence of Barneveldt, ratified all his proceedings, and at his bidding took decisive steps towards summoning a national synod, 13th November, 1618. [See *DOUGLAS* *OP.*] Previous to this Barneveldt and his friends, Grotius and Hoogerbeets, had been arrested (21st February, 1618) by the States-general, acting under Maurice. The trial of the prisoners commenced 19th November, 1618. It was in vain that Barneveldt protested against the illegality of the whole proceedings, and that he triumphantly refuted all the charges urged against him. He was found guilty, among other things, of "having brought the church of God into trouble," and sentenced to death. It was deemed, however, expedient not to carry the sentence into effect till it had received the sanction of the decision of the synod, which then held its sittings. The synod closed its sittings on the 9th of May, 1619, with a denunciation of all those who had opposed the Calvinist clergy. On the 13th of May Barneveldt was beheaded on a scaffold erected in the courtyard of the Haghe, where he met his fate with that calm courage which attended him throughout life. As he bowed his head to the axe he exclaimed, "O God, what is man!" Some interesting information relating to Barneveldt is given in the "Life and Death of John Barneveldt," by J. Lothrop Motley (London, 1874).

BARNSELEY, a municipal borough and town in the West Riding of Yorkshire, in the parish of Silkstone, in the wapentake of Staincross. It is 173 miles from London by the Great Northern Railway, 39 miles S.W. of York, 9 miles S. of Wakefield, and 15 miles N. of Sheffield.

Barnsley, being in a straight line between Sheffield and Wakefield, both ancient and important towns, derived advantage from the intercourse carried on between them. But the great cause of its prosperity was the early establishment of manufactures. Wire-works were in existence here in the time of James I. These works are said to have afterwards furnished the best wire in the kingdom, and it was much in demand for making needles. Barnsley has in a great measure lost its ancient trade, but has acquired a new one, to which its present prosperity is almost entirely owing.

The linen trade is now the chief support of the town. Its fabrics are linen cloth, damasks, diapers, drills, ducks, checks, and ticks. The great improvement which Barnsley has made in the production of these articles is a main cause of the prosperous state of the town. In damasks and drills it is generally held to be unrivalled. There are extensive bleaching works and dye-houses, as well as spinning machinery, and a large quantity of hand looms, all connected with the staple commodity of the town.

In addition vast blasting furnaces have sprung up in recent years, and works for railway and other heavy castings, as well as Bessemer steel-works, have been estab-

lished. The town also has some paper-mills. The extensive coal-mines in the vicinity furnish a large quantity of "Barnsley bed," or "hard coal." A large quantity is sent to Hull and Grimsby for steam purposes; and still more, mostly of the Silkstone varieties, is forwarded to London for household consumption. There are saw-mills, corn-mills, and malt-houses. The commerce of Barnsley is greatly aided by the Dearne and Dove Canal, which passes near the town and connects it with the river Don. The Barnsley Canal communicates with the Yorkshire river Calder. A direct line of railway to Hull was constructed in 1883.

The town, which is situated on rising-ground, is well built and has a very prosperous appearance. The sewerage was formerly very imperfect, but new sewerage works were constructed in 1877 at a cost of £50,000. The Beckett Dispensary, founded and endowed by J. S. Beckett, Esq., of Barnsley, was opened in 1865. A new cemetery, with Gothic chapels, lodges, &c., was formed outside the town in 1861. In 1862 the widow of Mr. Joseph Locke, M.P., the well-known engineer, presented to the town, in memory of her husband, a new park of about 20 acres, which in 1875 was more than doubled by an additional 22 acres by her sister. There are several churches in the town, and chapels for all denominations of dissenters, as well as literary and benevolent institutions. A grammar-school was built and endowed in 1660 by Thomas Keresforth, but the net income from his endowment seldom amounted to more than £20 a year. In 1861, however, the widow of Mr. Joseph Locke, M.P., placed the sum of £3000 in the hands of the trustees for investment at their discretion, with the view of improving the education imparted in the school; and there are now several Locke scholars, for whom six guineas per annum each are paid from the interest of the above sum, and who are chosen by competitive examination from any boys in the parish between ten and fourteen years of age who like to compete.

The population of Barnsley in 1881 was 29,790—an increase of 6769 since 1871. The town is called *Barnesleye* in Domesday Book. About a mile distant are the ruins of Monk Briton Priory, and the surrounding district is one of great natural beauty.

BARNSTABLE, a port of entry of Massachusetts, United States, on the S. of Barnstable Bay, which opens into Cape Cod Bay. It is 65 miles S.E. of Boston, and 28 miles S.E. of Plymouth. At the mouth of the bay is a bar having on it 6 or 7 feet of water. The inhabitants are extensively engaged in the coast trade and the fisheries, and also in obtaining salt from some extensive salt marshes in the neighbourhood. Steamboats ply regularly between this port and Boston. The population in 1880 was 4242.

BARNSTAPLE, a parliamentary borough and seaport town of Devonshire, is situated on the eastern bank of the river Taw, 6 miles from its mouth, in a broad and fertile valley, bounded by a semicircular range of hills, 211 miles W. by S. of London by the London and South-western Railway, and 38 N.W. of Exeter. It is a very ancient town, and probably existed previously to the reign of King Athelstan, who is said to have built a castle here, and to have erected the town into a borough. At the time of Domesday survey there were forty burgesses within the walls and nine without. Barnstaple returns two members to the House of Commons. In 1881 the population of the municipal borough was 12,288, and of the parliamentary 12,494, an increase of 681 since 1871. The number of voters in 1884 was 1760. Population of parish, 9518.

Barnstaple is a handsome and generally well-built town, and may be regarded as the metropolis of North Devon. It has of late years increased in importance. Many new houses have been built, particularly in the suburbs on the London road, named Newport. A large number of respectable families have been induced, by the pleasantness of its situation and the comparative cheapness of provisions, to settle

here. The town is clean and well drained, and has a good supply of water, obtained from a large reservoir formed in Rawleigh Park, and fed chiefly from a stream that rises in the hills about 5 or 6 miles N. of the town. The river spreads to a considerable breadth, but it is shallow, and accumulations of mud and sand have blocked up the harbour to all but small vessels. A fine quay stretches along the river to a great length, and is terminated at one end by a handsome piazza. The Taw is crossed by an ancient stone bridge of sixteen arches, which has been widened in a very ingenious manner by ironwork on each side, supporting footpaths and a railway. The market-place is said to be the finest in the west of England. Of the public buildings of recent erection the most notable are the town-hall and the municipal offices, which latter were completed in 1873 at considerable cost; the new wing of the North Devon Infirmary, erected in memory of the late Earl Fortescue, lord lieutenant of Devonshire; a music hall, the largest room in the town, capable of holding 1000 persons; a vegetable market; a Prince Consort memorial tower 60 feet high, comprising a clock with four faces, and a drinking fountain; a Wesleyan chapel, erected in 1869, tastefully constructed of Bath stone, Second Pointed style, the interior very judiciously arranged, seating 900; a Catholic chapel; and a bank. The church, dedicated to St. Peter and St. Paul, is a spacious old building, with a handsome spire. There is an endowed grammar-school, in which the poet Gay, a native of the neighbourhood, and Bishop Jewel were educated. There are lace and pottery manufactories in the town, a large steam bread and biscuit factory, and some shipbuilding.

In consequence of the increasing disadvantages of its harbour, much of the trade of Barustaple has been transferred to Bideford. Nevertheless, it still enjoys the advantage of being the port for an extensive and improving inland district, and carries on a steady trade. The imports consist chiefly of timber and deals, and the exports of manufactured goods and agricultural produce. The number of vessels registered as belonging to the port in 1885 was 50 (2100 tons). The entrances and clearances each average 1800 (110,000 tons) per annum. Barnstaple furnished three ships against the Spanish armada, and in the latter part of Elizabeth's reign it is mentioned as a considerable depot for wool, and as having an extensive trade with France and Spain.

BAROACH. See BROACH.

BARO'DA, a non-tributary state in direct political relation with the government of India, including all the territories of the Mahratta chief, his Highness the Gackwar, in different parts of the province of Guzerat, Bombay. These territories (lying between 21° 51' and 22° 49' N. lat., and between 72° 58' and 73° 55' E. lon.) have a total area of 4399 square miles, and a population of 2,000,000. They are divided into four administrative divisions, each of which is much intermixed with British territory, and also with the lands belonging to the minor chiefs, tributary to the Gackwar, but under the political supervision of the British government.

The northern districts in Guzerat form a wide plain, drained by the rivers Nerbudda, Tapti, Mahi, and several smaller streams. The surface consists chiefly of *regar*, or black cotton soil, and a light coloured soil locally known as *goraru*. The roads are generally lined by hedges of cactus, irregularly planted. Deserted towns, ruined temples, and tanks, now partly filled with mud, bear testimony to the former prosperity of the country—Okhanumdal, in the extreme north-west of the peninsula of Kathiawar, surrounded on three sides by the sea or the Gulf of Cutch, partakes of the general appearance of the province of Cutch, being everywhere sandy and covered with loose stones. The country is open, the soil good, and well watered with perennial streams. The central division, surrounding the city of

Baroda, is perfectly flat and covered with trees, the soil fertile and highly cultivated, yielding crops of the most highly prized cotton. The fourth, or southern division, including the lands that intermix with the British district of Surat, is also fertile and well cultivated, especially in the neighbourhood of the town of Navsari.

Luxuriant crops are grown of grain, cotton, tobacco, opium, sugar-cane, and oil-seeds. The staple food of the people is *bajra*, but wheat and rice are also largely consumed. The northern division of Baroda is famous for its breed of large white cattle. Those used for travelling carts are of great size and strength, and able to travel considerable distances. The breed of horses raised in the Kathiawar district is celebrated throughout India.

BARODA, the capital of the territory, is connected by railway with Bombay, and has a population of 115,000, being the second city of Guzerat, and third in the Bombay Presidency. It is situated east of the deep sunk bed of the little river Vishwamitri, over whose tortuous course and side channels four stone bridges have been erected, leading from the cantonment to the town. The city proper is intersected by two spacious streets, dividing it into four equal parts, meeting in the centre in the market-place, which contains a square pavilion with three bold arches on each front. This pavilion is a Moghal building, as is everything else that has the smallest claim to grandeur and elegance. The Mahratta structures are mean and shabby—none more so than the Parbar finished by Fatch Sinh, which resembles most Hindu palaces in want of taste and proportion of architecture and elegance in the interior decorations. This condemnation applies equally to the palace built by the Syaji Maharaja, and occupied by the present Gackwar—a shapeless heap of crowded little rooms and narrow winding staircases. Immediately behind it towers high above the town the Nagar Bagh Palace. Although unduly crowded by the neighbouring houses, this lofty edifice has some architectural merit, and the interior is not wanting in finish. The large majority of the houses of Baroda are of the meanest description, and so overcrowded that the chief sanitary problem is how to devise accommodation for the large number of inhabitants.

But most notable of all the edifices in Baroda are the Hindu temples which crowd this religious city. Close by the stone bridges are two temples to Siya, while numerous lesser shrines perpetuate divine honours rendered to those who have ruled the state. In them may be seen either their images in stone, life-size, or at least their feet as far as the ankle. These are the benefactors who instituted or continued the *khichadi*, or practice of giving food daily to thousands of male and female Brahmans of the Deccan. This extravagant liberality was extended by Khandi Rao to the Mussulman poor.

A treaty of amity was entered into by the East India Company's government with Fatch Sinh Gackwar, in 1780, but little intercourse ensued between the two governments until 1802, when Anund Rao Gackwar applied to the governor of Bombay for assistance to put down the rebellion of Mulhar Rao, a member of his family who was striving to obtain the sovereign authority in Guzerat. A small force was despatched to his assistance, and the rebellion was entirely suppressed. The treaty which at this time was concluded with the Gackwar contained an undertaking on the part of the British to liberate that prince from the state of thralldom in which he was then held by his mercenary Arab troops, who were in consequence ejected from Guzerat. Treaties were afterwards made with the Gackwar in 1802, in 1805, and in 1817, by which the relations between the British government and the Gackwar were arranged. These relations have always been those of friendship, nor have they at any time been embittered by the memory of any hostile collision. During the crisis of the Indian mutiny the Gackwar Khandi Rao rendered

conspicuous service, and when he died in 1870 it was felt that the British had lost a staunch friend, and his people a prudent and beneficent prince.

Khandi Rao left no heir, and the posthumous child of his wife, the Princess Jamma Bai, proving a daughter, his younger brother, Mulhar Rao, was allowed to assume and retain the rank of ruler. The antecedents of this prince were not of a character to inspire much confidence in his capacity to direct the affairs of the state with happy results, and the event soon proved that the worst anticipations were justified. He was called upon in 1874 to institute certain necessary reforms, and a definite period was given him, within which they were to be carried out. The progress of the threatened complication was precipitated by the attempt to poison the resident, Colonel Phayre, and by the implication of the Gaekwar himself in the crime. Mulhar Rao was then suspended from his post, and the circumstances were investigated before a mixed commission. But the members, three of whom were English and the other three natives, were unable to agree in their decision, and the supreme government thereupon thought itself bound to intervene and decree the removal of Mulhar Rao for his "notorious misconduct" and "gross misgovernment." The difficulty then became to find a suitable successor for him, and, after as brief a deliberation as possible, the Princess Jamma Bai was allowed to adopt as her son a young prince named Maharajah Sivaji Rao, who was a direct descendant through a younger son of Pilaji Rao, the founder of the house. He was invested with full sovereignty in 1882. During his minority the state was governed under the control of British officials, but great assistance was also given by the experienced and talented native minister Madhava Rao. As a consequence of this enlightened government Baroda recovered all, and more than all, its old prosperity, and the new Gaekwar succeeded to the sovereignty of a territory, the material resources of which had been greatly developed by the strict maintenance of tranquillity and by the removal of all causes of disquiet.

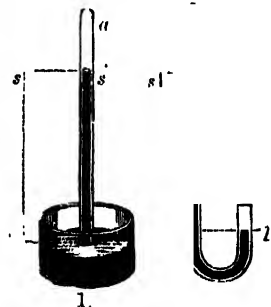
BAROMETER (from two Greek words, *baros* and *metron*, signifying "the measure of weight") is only applied to those instruments in which a column of air is weighed against that of mercury.

The phenomena of the common pump, which were known before the Christian era, were long explained by the simple maxim that "nature abhors a vacuum," without any attempt to discover the reason of the supposed abhorrence, until, in the time of Galileo, the pump-makers of the Duke of Florence found that water would not rise higher than 32 feet, or thereabouts. They applied to Galileo for a solution of this problem, but he does not seem to have discovered the true cause of the phenomenon. His pupil Torricelli, however, imagined that the weight of the atmosphere might be the counterpoise to the 32 feet of water; and applied himself to try this hypothesis by experiment. He saw that, if it be a weight of air which counterpoises the 32 feet of water, by the substitution of mercury instead of water the height of the column necessary to counterpoise the weight of air would be reduced in the proportion in which mercury is heavier than water. For instance, that if mercury be fourteen times heavier than water, bulk for bulk, the fourteenth part of 32 feet, or about 2 feet 4 inches, would supply the place and produce the effect of the water. (Mercury is really about $13\frac{1}{2}$ times as heavy as water.) He accordingly filled a tube, more than 3 feet long, and open at one end only, with mercury; and then, stopping the open end with the finger, he placed the tube in an open vessel of mercury with the open end downwards. On removing the finger, the mercury in the tube sank until it stood in the tube at about 28 inches higher than the mercury in the vessel. He thus discovered what is to this day considered the best form of the mercury barometer.

Torricelli died shortly afterwards (1647), leaving his

great discovery not quite complete. The invention, however, was taken up by Pascal, Merenne, and others in France, and by Boyle in England. The latter, by means of the air pump, was enabled to subject air of different degrees of density to the test of the barometer. Pascal did the same; and, in addition, first suggested (in 1647) that if the mercury were sustained by the weight of the air, it would necessarily fall in ascending a high mountain by the diminution of the superincumbent column of air. He accordingly requested his relative, M. Perrier, to try the barometer at the summit and the base of the mountain of Puy de Dôme, in Auvergne, and the result was that the mercury, which at the base stood $26\frac{1}{2}$ inches (French), was only $23\frac{1}{2}$ inches at the summit. Pascal afterwards found the same result sensibly shown in the ascent of a church tower and of a private house. The continual variations in the altitude of the mercury naturally led to the idea of using the barometer as a *weather-glass*, while the frequent smallness of the amount of such changes rendered it desirable so to construct the instrument that their effect should be multiplied and rendered as plainly visible as possible. Hence many modifications of the original form of the instrument were soon introduced, some of which provided for the fact that, since an alteration of level in the tube produces also an alteration in the cistern, the difference of levels cannot be exactly seen by simply reading off the height of the mercury against a fixed scale of inches. Morland's plan of bending the tube so as to present a greater measuring surface in the same rise of level is very ingenious, but has the disadvantage of being cumbersome (see fig. 5, Plate I.)

In the annexed diagrams *a* represents in every case the closed or vacuum end of the tube, and *p* the place where the mercurial or other column communicates with the atmosphere. The diagram represents first the simple apparatus of Torricelli above described, in which, from *a* to *s* is the vacuum, or at least the space filled only with the *vapour of mercury*, noticed below. The second figure represents the *siphon barometer*, which was early adopted as a more convenient form than that

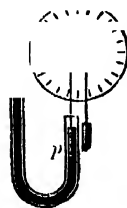


of Torricelli, but which has this disadvantage, that the variation of levels is equally divided between the two limbs of the siphon, and is therefore not so distinctly visible at the point *s* as in Torricelli's, where, if the surface of the mercury in the cistern were twenty times as great as in the tube, the variation of level in the tube would be twenty times as great as in the cistern. Annexed is a form of siphon barometer which provides for the attainment of this important difference. Descartes, Huyghens, and Dr. Hooke devised barometers in which the use of one or more fluids of different specific gravity in connection with mercury was tried as a means of obtaining more distinct indications of very small changes of level; and many other forms of simple mercurial barometers have been constructed.

One contrived by Amontons, consisting of a conical tube of glass closed at the smaller end, partially filled with mercury, and then inverted, is more simple and elegant in principle than any other; but the obtaining of a tube of the requisite accuracy is almost an ideal supposition. One contrived by



Gay-Lussac for portable purposes permits the access of air to the mercury only by a hole too minute to allow the escape of mercury. Fortin's is a Torricellian barometer with a contrivance for raising or lowering the bottom of the cistern by a screw, so as to adjust the lower level of the mercury exactly to the zero point before commencing an observation. This principle is also adopted by Troughton (see figs. 13, 14, Plate II.) Hooke's *wheel barometer*, though too inaccurate for scientific use, is very much used as a weather-glass; for which it may answer well enough, if it be remembered that it is not the *state* of the barometer which furnishes any probable test of the weather, but the *change* which is taking place for the time being. This change is indicated by it pretty distinctly, though it cannot be trusted for showing either the exact amount of the change, or the exact height of the column of mercury. In



1.

this contrivance, represented in the figure, a weight is placed on the mercury of a siphon barometer, and nearly counterpoised by another weight connected with it by a string which passes over a pulley. The movement of the mercury causes this floating weight to rise and fall, and consequently the pulley, which carries an index, to turn more or less on its axis.

In order to construct good barometers the mercury must be perfectly pure and good, and free from the small coating of air which adheres to all bodies in their natural state. The interior of the tube must also be freed from this coating of air, which, if allowed to enter with the mercury, would in time expand and render the vacuum above the mercury imperfect. All these ends are gained, in a great degree, by boiling the mercury in the tube previously to inverting it and thus forming the vacuum. A part of the mercury should first be boiled in the tube, and the rest added in a hot state; after which the boiling should be repeated. One of the best tests of a good vacuum is when, by shaking the tube, the mercury strikes the glass at the closed end of the tube with a hard, well-defined, and instantaneous tap. The vacuum can never be quite perfect; for, generally speaking, a small quantity of air will remain; and besides this, mercury itself will rise in vapour into the presumed vacuum, though not to so great a degree as to cause any perceptible pressure, and not more than it would rise in the air. If there be moisture in the supposed vacuum, the mercury will sink on applying the hand, or any other warm substance.

To observe the temperature of the mercury, which, by altering its bulk, affects the indications of the barometer, a thermometer is attached to the best instruments (see fig. 9, Plate II.) All observed heights should be reduced to what they would be at some given temperature, say the freezing-point of water. It must be remembered that the scale itself, on which the heights are measured, expands or contracts with the mercury. If the two expanded or contracted equally, there would be no occasion for any correction; but if the mercury expand more than the scale, it is the difference of the expansions by which the observed height will be wrong. Mercury expands more than the material of any scale which is ever employed. The expansion of the barometer-tube itself need not be attended to. The consequence of it is, that more mercury is drawn out of the cistern to form the requisite column; but the height of the column is unaltered. The height observed requires another correction for the *capillary* repulsion, by which it stands somewhat lower than it otherwise would do; but in a siphon barometer like fig. 2 such correction is unnecessary, because the depressive force is equal on both sides.

The Glycerine Barometer.—Although mercury is the

most convenient material for barometers, other substances are used where fine measurements are required, and a larger variation is needful than that exhibited on the small scale of the barometer. The best of these substances is undoubtedly glycerine. A fall or rise of one-tenth of an inch in the mercurial column attracts little attention, and is apt to be thought of no consequence; but when the same causes are shown to make a difference of more than an inch in the height of the glycerine column, no intelligent person can fail to be impressed by their meaning. In 1830 Professor Daniell made for the Royal Society a water barometer, but the effect of changing temperatures on the water vapour in the Torricellian vacuum masked the indications of varying pressure. Other experiments in the same direction gave similar unsatisfactory results, and it was not until Mr. Jordan, of the Museum of Practical Geology in Jernyn Street, constructed his glycerine barometer in 1882 that the problem, simple as it appears, could be considered solved. The boiling point of glycerine is 400° Fahr., and a very low temperature is required to solidify it. Therefore, ordinary atmospheric temperatures only produce changes in the length of the glycerine column by expansion or contraction of the liquid itself. The specific gravity of pure glycerine is 1.26, or less than one-tenth that of mercury; so that the mean height of the glycerine column is 27 feet at sea-level. A variation, therefore, of one-tenth of an inch in the height of the mercurial column is shown on the glycerine, as already stated, by a variation of more than an inch; and with this vastly increased range and visibility and sensitiveness, the only serious drawback found by Mr. Jordan was the tendency of glycerine to absorb moisture from the atmosphere. He ingeniously overcame that defect by covering the surface of the liquid in the barometer cistern with a shallow layer of heavy petroleum-oil, thus neutralizing its absorbing tendency while the atmospheric pressure remained intact. The tube forming the body of the instrument is an ordinary composition metal gas-pipe, three-eighths of an inch internal diameter, and furnished at the top with a gun-metal socket, into which is cemented a glass tube 4 feet long, and having an inside diameter of 1 inch. In this tube the fluctuations of the top of the column are observed, and the height read off on brass scales placed on either side of the tube, and fitted with indices and verniers, moved by milled heads. The glycerine is coloured red by aniline. One of these barometers was constructed for the Kew Observatory, the Royal Society committee devoting a small grant from the government fund at its disposal for the purpose. Another was placed in the Museum of Practical Geology in Jernyn Street, a third at South Kensington, &c.

The Aneroid Barometer.—The weight of a column of air, which in the ordinary barometer acts on the mercury, in the aneroid presses on a small round metal box from which nearly all the air has been extracted, and as its indications are obtained without the use of mercury or any other fluid, we have the etymology of the word in the Greek *an*, without, and *meros*, fluid. It was invented by M. Vidi of Paris, and has of late years been considerably improved. It has some advantages over the mercurial barometer in sensibility and portability, as it admits of being carried in the pocket, and may be used on a journey in situations where the ordinary barometer would be inconvenient. The external appearance of the aneroid is that of a brass box with an enamelled dial face covered with glass. In the centre of the dial is a pivot for the reception of a needle, which moves over a series of graduations marked from 28 to 31, to represent the inches of the ordinary barometer, and over these graduations are the usual words "stormy," "much rain," "rain," &c. The following testimony as to its value has been given by the Board of Trade:—"The aneroid is quick in showing the variation in atmospheric pressure, and to the navigator,

who knows the difficulty of using barometers at times, this instrument is a great boon, for it is steady under all circumstances of weather, at the same time giving indications of increased or decreased pressure. It is a good weather-glass to be suspended on or near the upper deck for easy reference. In ascending or descending elevated land the hand of the aneroid may be seen to move like the hand of a watch, showing the height above the level of the sea." For measuring altitude above sea-level, pocket aneroids the size of a watch are made, graduated not in inches and fractions of inches, but in feet, hundreds of feet, &c., above sea level, so that a glance at the instrument at once indicates the height. The rise of a gentle gradient, as a railway train moves over it, is quite apparent on such an instrument.

In using the barometer as a weather-glass, it must be remembered that no rule which can be given will always hold true. The rising of the mercury usually presages fair weather, and its falling foul weather, as rain, snow, high winds, and storms, the lowest fall being found in great winds, though unaccompanied by rain. It is rather the warmth (and consequent rarefaction) of the air than its moisture that makes a low barometer indicate rain; but in England a warm wind and a wet wind are synonymous. But in La Plata, for instance, the cold wind (giving a high barometer) is the rain-bringer; a low barometer given by a warm wind indicates fine weather. In fact, as a weather glass the barometer varies in different places. In very hot weather the falling of the barometer usually foreshows thunder; in winter the rising presages frost; in frosty weather a continued fall foretells a thaw and in a continued frost a rise indicates the approach of snow. If a change of weather follows very close upon a change in the barometer, it may be expected to last but for a short time, and *vice versa*; and where the motion of the mercury is unsettled changeable weather may be anticipated. Most of the London daily papers give barometric readings daily. See METEOROLOGICAL.

The Plates I., II. contain figures of different kinds of barometers—Descartes' barometer, fig. 1; barometer of Huygens, fig. 2; of Hooke, figs. 3, 6; of Bernoulli, fig. 4; of Morland, fig. 5; the lever barometer, fig. 7; Jones' chamber barometer, fig. 8; Adie's marine barometer, fig. 9; Troughton's barometers, figs. 10-14; Aneroid barometer, fig. 15.

BAROMETZ or BARANETZ. See CROTONUM.

BAR'ON, BAR'ONY. The derivation of this word is extremely uncertain; but a conjecture of the distinguished historian, E. H. Freeman (in his "Old English History"), is worth notice. He draws attention to the well-known song of Brannanburh, "The Victory of Æthelstan," as told in powerful verse in the Saxon Chronicle:—

"Now Æthelstan King
Of Earls the Lord
Life and glory
Woe, in the fight
With the sword's edge
By Brannanburh:"

where the word translated "earls" is *beorn*. Coupling this with the ancient Old German word *bar*, a man, we can see reason for saying that Æthelstan's *men*, or *beorns*, were the Saxon equivalent of the Norman barons who afterwards so ruthlessly dispossessed their posterity. The word baron, in England, appears to have always denoted a person belonging to a particular class. The barons were those who held lands by military and other services, and were bound to attendance in the courts of their superior to do homage, and to assist in the business transacted there. The court in which these tenants performed their services is still called the Court Baron.

As the earls and bishops, and other great landowners, to use a modern expression, had a number of persons who

held parts of their lands for certain services to be rendered in the field or in the court, so the lands which those earls and great landowners possessed were held by them of the king, to whom they had in return certain services to perform of the same kind with those which were due from their tenants; and as those tenants were barons to them, so were they barons to the king. But as these persons were, both in property and in dignity, superior to the persons who were only barons to them, the term became almost exclusively applied to them; and the barons in the early history of the Norman kings of England are the persons who held lands immediately of the king.

In the writers on the affairs of the first two centuries and a half after the Conquest the barons were tenants in chief of the crown. After the Conquest, there was an actual or fictitious assumption of absolute property in the whole territory of England by the king, and grants of large tracts were made both to ecclesiastics and laymen. In proportion to the extent and value of the lands given by the king, services were to be rendered. The services were of two kinds: first, military service—that is, every one of those tenants (or holders) was bound to give personal service to the king in his wars, and to bring with him to the royal army a certain quota of men, corresponding in number to the extent and value of his lands; and secondly, civil services, which were of various kinds, sometimes to perform certain offices in the king's household, to execute certain duties on the day of his coronation, to keep a certain number of horses, hounds, or hawks for the king's use, and the like. They were also bound to personal attendance in the king's court when the king summoned them, and to do homage to him, to acknowledge themselves to be his *homines* or *barones* (the two words are identical in meaning, the one from the Teutonic *bar*, the other from the Latin *homo*, each meaning "man"), and to assist in the administration of justice, and in the transaction of other business in the court of the king. These were the rude beginnings of the modern parliaments, assemblies in which the barons are so important a constituent. But among the great tenants of the crown there was diversity both of rank and property. Some of them had also a title which descended to their posterity; these are the *comites* of "Domesday-book."

All these persons, the earls included, were the barons, or formed the baronage of England. They were all equally bound to render their service in his court when the king called upon them. Two classes of barons, however, appear in early documents—the greater and the lesser barons.

Many of these lesser barons became the progenitors of families of rank and consequence in the country. Their tenancies were sometimes so extensive that the holders of them were enabled to exhibit a miniature representation of the state and court of their chief. They affected to subinfeud, to have their tenants doing suit and service. The process of subinfeudation was checked by a statute of King Edward I., passed in the eighteenth year of his reign, commonly called the statute *Quia Emptores*, &c., which directed that all persons thus taking lands should hold them, not of the person who granted them, but of the superior of whom the grantor himself held.

We are now arrived at a time when the word *baron* acquired a sense still more restricted. Later than the reign of Edward II. we seldom find the word *baron* used in the chronicles to designate the whole of that body who had compelled the kings to yield the charters. The counts or earls, from this time, stand out more prominently as a distinct order. There were next introduced into that assembly dukes, marquesses, and viscounts, to all of whom was given a precedence before those barons who had not any dignity, strictly so called, annexed to the service which they had to render in parliament. The baron thus became the lowest denomination in the assembly of peers. The

term also ceased to be applied to those persons who, though they possessed a tenancy in chief, were not summoned by the king to attend the parliament; and the right or duty of attendance, from the time of King Edward I., has been founded, not, as anciently, upon the tenure, but on the writ which the king issued for their attendance.

Out of this has arisen the expression *barons by writ*. The king issued his writ to certain persons to attend in parliament, and the production of that writ constituted their right to sit and vote there. Copies of these writs were taken, and are entered on the close roll at the Tower. The earliest are in the latter part of the reign of King Henry III., in the forty-ninth of his reign. The received opinion has been that a heritable dignity was thus created, and that the barony would endure as long as there were heirs of the body of the person to whom the king's writ had issued.

The privileges of the barons in no respect differ from those of the other members of the House of Peers. See PEERS OF THE REALM.

The coronation and parliamentary robes of a baron very closely resemble those of an earl; and since the reign of Charles II. barons have been entitled to wear a coronet adorned with six large pearls set at equal distances on the chaplet. In writing to a baron he is addressed as "The Right Honourable Lord (Cameys)," and in conversation as "My Lord," or "Your Lordship;" and in signing he subscribes his titular distinction ("Cameys," simply). The wife of a baron has also the title of "Right Honourable Lady (Cameys)," and is addressed as "Your Ladyship;" while the children enjoy the prefix of "Honourable" to their family names, as the "Hon. H. J. Stonor" (son of Lord Cameys).

The most complete information on this subject is contained in the printed "Report from the Lords' Committee, appointed to search the Journals of the House, and Rolls of Parliament, and other Records and Documents, for all matters touching the Dignity of a Peer of the Realm" (1819). The term barony is used in Ireland for a subdivision of the counties, and there are in that country altogether 250 such divisions. They are somewhat equivalent to what is meant by hundred or wapentake in England.

It now remains for us to notice two peculiar uses of the word baron:—

1. The chief citizens of London, York, and of some other places in which the citizen possess peculiar franchises, are called in early charters not unfrequently by the name of "the barons" of the place.

2. The Barons of the Cinque Ports are so called probably for the same reasons that the citizens of London and of other privileged places are so called. See CINQUE PORTS.

BARONAGE. This term is used to signify the whole of the nobility of England, without regard to the distinction of dukes, marquesses, earls, viscounts, and barons, all of whom form what is now sometimes called the baronage. In this sense the term is used in the title of the "Baronage of England," by Sir William Dugdale, who was the norroy king-at-arms, and one of the last survivors of the eminent antiquarian scholars of the seventeenth century.

The first volume of Dugdale's Baronage was published in 1675; the second and third, which form together a volume not so large as the first, in 1676. The work professes to contain an account of all the families which had been at any period barons by tenure, barons by writ of summons, or barons by patent, together with all other families who had enjoyed titles of higher dignity, beginning with the earl of the Saxon times. The present annual compilations of Debrett, Burke, Lodge, &c., are worthy and accurate successors of Dugdale.

BARONET, an English name of dignity, which in its etymology imports a little baron. But we must not

confound it with the lesser haron of the middle ages [see **BARON**], with which the rank of baronet has nothing in common; nor again with the banneret of the same period. See **BANNERET**.

This order originated with King James I., who, being in want of money for the benefit of the province of Ulster in Ireland, hit upon the expedient of creating this new dignity, and required of all who received it the contribution of a sum of money, as much as would support thirty infantry for three years, which was estimated at £1095, to be expended in settling and improving the province of Ulster.

The principle of this new dignity was to give rank, precedence, and title without privilege. He who was made a baronet still remained a commoner. According to the terms of the patent the baronet acquired—1, precedence in all commissions, writs, companies, &c., before all knights, including knights of the bath and bannerets, except such knights bannerets as were made in the field, the king being present; 2, precedence for the wives of the baronet to follow the precedence granted to the husband; 3, precedence to the daughters and younger sons of the baronet before the daughters and younger sons of any other person of whom the baronet himself took precedence; 4, the style and addition of baronet to be written at the end of his name, with the prefix of Sir; 5, the wife of the baronet to be styled Lady, Madam, or Dame. It was stipulated on the part of the king that the number of baronets should never exceed 200, and that when the number was diminished by the natural process of extinction of families, there should be no new creations to supply the places of those extinct, but that the number should go on decreasing.

The earliest patents bear date of 22nd May, 1611. It was not till 1622, a little before the death of King James, that the number of 200 was completed. At the death of James 205 patents had been issued, and the number of members of this order is now understood to have no other limit than the will of the sovereign. In the time of Charles II. the custom was to remit the payment of the money for the support of the soldiers, and a warrant for this remission is now always understood to accompany the grant of a patent of baronetcy. The old rule of requiring proof of coat-armour for three descents has in numerous instances not been insisted on. All baronets are entitled to bear in their coats of arms the arms of Ulster—viz. a bloody hand.

James I. designed to establish an order of baronets in Scotland for the encouragement of the planting and settling of Nova Scotia. He died, however, before any proceedings had been taken. His successor adopted the scheme, and in 1625 granted certain tracts of land in Nova Scotia to various persons, and with them the rank, style, and title of baronets of that province, with precedence analogous to the precedence given to the baronets of England. It was proposed that the number should be limited to 150. There were frequent creations of this dignity till the union with Scotland in 1707, when the creation ceased.

Baronets of Ireland were instituted by King James I. in 1620, for the same purpose as the baronets of England. The money was paid into the Irish Exchequer.

BARONIUS, CESAR, was born 31st October, 1538, at Sora, in the kingdom of Naples. His father was Camillo Baronio, his mother Porzia Febonia, both of noble families. He received his first education at Veroli. He studied divinity and law at Naples, and afterwards at Rome, where he placed himself under the discipline of St. Philip de Neri, the founder of the congregation of the Oratory, by whom, after he was ordained priest, he was attached in 1564 to the congregation of the Church of St. John the Baptist in that city. In 1593 St. Philip de Neri, having laid down the office of superior of the congregation of the Oratory, appointed Baronius his successor; and Pope Clement VIII.

not only approved the choice, but some time after made Baronius his confessor, and also a cardinal, 5th June, 1596. Baronius died at Rome, 30th June, 1607. Baronius was a man of piety, probity, and learning. He undertook his most celebrated work, his "Annales Ecclesiastici," or "Ecclesiastical Annals," when he was thirty years of age, and continued for thirty years collecting and digesting his materials. The first volume of this work, which includes the first century after Christ, was published in 1588; the twelfth and last, which concludes with the year 1198, was printed in 1607, under the pontificate of Paul V. These twelve volumes contain the history of the twelve first ages of the church. Baronius left materials for three more volumes, which were used by Raynaldus (Odorico Rinaldi) in his "Continuation of Baronius' Annals." Mazzuchelli ("Scittori d'Italia," folio, Brescia, ii. pt. i. p. 387) enumerated nineteen different works of Baronius in print and manuscript. The great work of Baronius has been severely criticised by Holstenius, Isaac Casaubon, Conrber, and others, on account of its alleged errors and mistakes; but these, perhaps, are not more numerous than are to be expected in a work of such great extent. Besides Rinaldi's, there are two other continuations of Baronius' Annals—one to the year 1572, by Bzovius (nine vols. folio, 1616-72); the other extending to 1639 (two vols. folio, Paris, 1639). The best edition of the works of Baronius is that of Mansi Luca, in forty-three volumes (1738-59), which gives Rinaldi's continuation and Pagi's critical examination and correction. A new edition, with a continuation, has been recently published at Rome.

BARQUE or **BARK**, a sea-going vessel, but porticularly used for any kind of boat. The word is from the Latin diminutive form (*barca*, short for *barica*, a little boat) of the Greek *baris*, and is, as far as is known at present, of Egyptian origin. *Baris* is to this day the Coptic word for boat.

The barque is a three-masted vessel, differing from a "ship" in the rig. A ship, properly and technically so called, has three masts, all square-rigged, and all with "tops." These sails are called *square* whose yards lie parallel to the horizon, and athwart the vessel. A barque has the foremast and mainmast also rigged in this way, but the mizemast (the mast nearest the stern) is fore-and-aft rigged; that is, it has no top, and is rigged similarly to a cutter, the lengthwise position of whose main-sail is familiar to everyone. There are, of course, several varieties of barque-rigged vessels differing in slight particulars, and some barques borrow some of the characters more properly belonging to "ships."

The word, when used in poetry, and occasionally in ordinary speech, to signify any kind of boat (even a rowing boat), usually adopts the English spelling, *bark*. Another form of the word in English, with a specialized meaning, is **BARICA** (which see).

BARQUICIMETO, the capital of the province of Nueva Segovia, in Venezuela, stands in a healthy situation on a high plain, in 9° 50' N. lat., 69° 20' W. lon. The city, which was founded by the Spaniards in 1522, was destroyed by an earthquake in 1812. Previous to this disaster it had a population of 15,000. It was afterwards rebuilt, and the population now amounts to about 26,000. The province extends along the coast of the Caribbean Sea, and produces large quantities of wheat, maize, coffee, cocoa, and indigo.

BARR or **BARRA**, a petty kingdom of Western Africa, at the mouth of the Gambia, and on its northern bank, containing an area of about 250 square leagues. This and some neighbouring kingdoms on the Gambia were founded by Amari Sonko, a Mandingo warrior, apparently for the purpose of facilitating the operations of the traffic in slaves. When Amari Sonko died his conquests were divided among his three sons, who respectively became sovereigns of Barra,

Kollar, and Badibou. Their descendants still reign, and the memory of these events is preserved by tradition among the people, who number about 200,000. They are strict Mohammedans, and are superior in physique and intelligence to the neighbouring tribes. They carry on a considerable trade with the interior. The territory of this small state is in general well cultivated, and contains a large number of villages of considerable size. The forests do not occupy more than one-eighth of the surface, which is rather marshy, but very fertile.

BAR'RA or **BAR'RAY** (from the Scandinavian Baray, "isle of the ocean"), one of the Hebrides or Western Isles of Scotland, belonging to Inverness-shire. It lies about 5 miles S.W. of South Uist, and is 8 miles long by from 2 to 5 miles broad. There are two or three sandy bays on the west coast, but elsewhere that side of the island presents to the Atlantic a series of high rocky cliffs, torn with fissures and pierced with caves. The east coast has two or three good harbours. The island contains some good pasturage, and its cod, ling, and herring fisheries are considerable, and the coasts abound with shell-fish, especially cockles. The lighthouse on Barra Head, the loftiest in Great Britain, is 680 feet above high water, and can be seen at a distance of upwards of 30 miles. The population of the island in 1881 was 1887, chiefly Gaelic-speaking Roman Catholics.

BARRACKPUR', a town with a military cantonment, on the left bank of the river Hoogly, 16 miles N. of Calcutta. On account of the salubrity of its air it is a favourite retreat for Europeans from Calcutta, and the governor-general has a country residence there, which was built by Lord Minto and enlarged by the Marquis of Hastings. Near it is the tomb of Lady Canning. Barrackpur has played an important part in two Sepoy mutinies. In 1824, when Bengal troops were required to take part in the Burmese war, the 47th Bengal Infantry, which was stationed here, was warned for foreign service. Though at first willing enough to march, a greatly exaggerated account of the cheek received by the British troops at Ramu cooled their enthusiasm; and when a lying story was circulated that, owing to the failure of the efforts of the commissariat department to obtain land transport, the men were to be put on board ship and taken to Rangoon by sea, the excitement, which had been gradually gaining force, developed into a determination to resist. In spite of the attempts at conciliation made by Colonel Cartwright, who commanded the regiment, they mutinied on parade on the 30th October, declaring that they would not go to Burmah by sea, and that they would not march unless allowed "double batta." A second time (on the 1st November) the Sepoys were mutinous on parade; and the following morning Sir Edward Paget, the commander-in-chief, after an ineffectual attempt at explanation, told the Sepoys that they must either obey the order to march or ground their arms. They refused, and a battery of European artillery, which Sir Edward had brought with him, supported by two English regiments, opened upon the mutineers. They broke at once, and made for the river, throwing away their arms. Some of them were shot, some drowned, and others hanged; and the number of the regiment was removed from the army list.

The mutiny of 1857 also commenced at Barrackpur. Early in that year the excitement about the alleged pollution of the new cartridges had made itself felt in every military station in India, and many of the Sepoys firmly believed that the English were deliberately plotting to destroy the caste of the native soldier, and to force him to embrace Christianity. A thousand absurd rumours obtained ready credence, despite the endeavours of General Hearsey, commanding the division, to allay the fears of the men. Incendiarism, clearly traced to the troops, had become common. The excitement grew more intense from week to week, until, on the 29th of March, the crisis was brought

about by a private of the 34th Native Infantry, named Mangal Pande, who attempted to kill one of the officers, Lieutenant Baugh, fired at a European sergeant-major, and called upon his comrades to join him. These outrages were committed within a few yards of the quarter-guard, where a native officer and twenty men were on duty, but no steps were taken to interfere. The regiment was disbanded with ignominy on the 6th of May, Mangal Pande and the native officer in charge of the guard having been previously tried by court-martial and hanged.

BARRACKS (from the Italian *baracca*, a soldier's tent—probably from the Gaelic *barrachad*, a hut of branches) is a term which was at first applied only to the huts occupied by soldiers in an encampment. Such barracks are generally made by fixing four poles in the ground and laying four others across them; the walls being afterwards built up with sods, wattles, or what the place may afford, and the top planked, clatched, or covered with turf. Barrack, in a wider sense, is now applied to the permanent buildings in which both officers and men are lodged in fortified towns or other places.

The word barrack does not occur in our older dictionaries, though it is found in Phillips' "World of Words" (folio, London, 1706); and a writer in a periodical paper entitled *Common Sense*, No. 105, published in 1739, speaks of permanent barracks for the lodging of troops as having then just been introduced.

Great opposition was made in Parliament, at the commencement of the French revolutionary war, to the erection of barracks on an extended scale, as being inimical to the liberties of the country; but the practice of quartering soldiers upon the inhabitants of a town or village was found to be attended with so many inconveniences, that the opposition to the proposed measure was at length withdrawn.

In most barracks, but especially in those situated in large towns, the sanitary arrangements were formerly in the most unsatisfactory state; but of late years great attention has been given to the subject, and improvements are continually being introduced highly conducive to the health and morality of the troops. The barracks at Aldershot are regarded as among the finest and best regulated in Europe.

BARRAS, PAUL JEAN FRANÇOIS NICOLAS, COUNT DE, a member of the French Directory, and an important actor in some of the principal events of the French Revolution, was born 30th June, 1755, at Foux, in the department of the Var. His family was one of the most ancient among the nobility of Provence. In 1775 he entered the army, and went twice to India, serving against the British army. On his return he plunged into dissipation. When the Revolution commenced he became one of its warmest partisans. Though he joined in the attack on the Bastille, he condemned many of the excesses which followed; but the part which he took was a decided one. He was a member of the *Jacobins' Club* from its commencement, and was engaged in the affair of 10th August, 1792 (massacre of the Swiss Guard), which virtually terminated the existence of the monarchy. Being sent to the National Convention as representative of his native department, he voted unconditionally for the death of Louis XVI. He took an active part in the proceedings of the Convention, in which, although he joined in overthrowing the Girondists, and in persecuting them after their flight, he opposed Robespierre. On the 9th Thermidor (27th July, 1794), Barras, Tallien, and some other deputies presented themselves to the Convention. Tallien denounced Robespierre, who was arrested with his faction; but by a device of the insurgent municipality they were refused admittance at the prisons and taken to the Town Hall in safety, where they planned a counter revolution. Henriot, commander of the Parisian Guard, a creature of Robespierre, marched on the Convention, which, in its imminent peril, named Barras general-in-chief, and charged him with its defence. Barras got

together some troops and arrested Robespierre, who, finding all was over, attempted to shoot himself, and was with his partisans executed next day. At a subsequent crisis of the Revolution, that of the 13th Vendémiaire (5th October, 1795), the Convention again named Barras general-in-chief. The success on this occasion was chiefly owing to Napoleon Bonaparte, to whom Barras, recollecting his services at Toulon, which had held out for the Girondists against the Convention, had confided the command of the artillery; and he afterwards obtained for Bonaparte that of the army of Italy. The anarchists being put down by the 13th Vendémiaire, the government of the Directory was formed, of which Barras was a member. It did not work well, and the *coup d'état* of the 18th Fructidor (4th September, 1797) was resolved upon as a means of effecting its more complete consolidation. For the third time Barras was invested with dictatorial powers, and success again attended his efforts. Two members of the Directory, Barthélemy and Carnot, about forty members of the legislative Council of Five Hundred, eleven members of the Council of Elders, and other individuals, were ordered to be transported to the swamps of Guiana, where several of them died. Carnot escaped into Germany. The power of the Directory, however, was far from being firmly fixed. The affair of the 30th Prairial (18th May, 1799) shook it to its foundations. The legislative councils now resumed their independence, curtailed the dictatorial power of the Directory, and obliged three of the directors to give in their resignation. Barras contrived to remain in office, though he had opposed this movement; but he and Siéyès, now one of the directors, were united as to the necessity of overthrowing the constitution of the year 3. General Bonaparte, having been apprised of these intrigues by his brother Lucien, left the army in Egypt, and arrived in Paris for the purpose of carrying his own personal projects of ambition into execution. Seconded by Siéyès, he effected the revolution of the 18th Brumaire (9th Nov. 1799), the immediate result of which was his nomination as first consul. From this period the power of Barras was annihilated. In 1813 Barras was incriminated in a conspiracy, and underwent an examination; after which he was exiled to Rome, but remained still under the watchful eyes of the French police. Here he was again accused of being connected with a conspiracy, but the preliminary investigations into its character and ramifications were broken up by the fall of Napoleon. In 1814 he took up his residence at Paris. In 1815, foreseeing new troubles about to burst on France, he withdrew from Paris, but returned on hearing of Napoleon's disembarkation, though during the Hundred Days he accepted no public employment. Afterwards he resided at Chaillot, near Paris, in the enjoyment of the considerable fortune he had contrived to amass. He died on 29th January, 1829.

BAR RATRY, BARATRY, or BARRETRY. The original derivation of this word is extremely uncertain. In English law it has a threefold signification. First, *baratry* is a misdemeanour at common law, and consists in frequently exciting and stirring up disputes and quarrels either by litigation in courts or otherwise; secondly, it is the name given to the offence of suing another in the name of a fictitious plaintiff, or one who has not consented to the suit; and thirdly, it denotes a fraud, or such a degree of culpable negligence as amounts to fraud or bad faith, committed by the master or mariners of a ship with relation to the ship or cargo under their care, by which the owners or freighters may be injured. The Italian word *barratrare*, from which the term *barratry* in this latter sense is immediately derived, means to cheat generally.

1. As to the misdemeanour of *barratry* at common law. This offence is very vague and indefinite in its nature, and has been little noticed in modern times by courts of justice. By 12 Geo. 1. c. 29, s. 4 (revived and made perpetual by 21 Geo. II. c. 3), if any person convicted of

common barratry shall practise as an attorney, solicitor, or agent in any suit or action, the judge or judges of the court where such suit or action shall be brought shall, upon complaint or information, examine the matter in a summary way in open court, and, if it shall appear that the person complained of has offended, shall cause the offender to be transported for a period of seven years. 2. Suing in the name of a fictitious plaintiff, &c. This offence, if committed in one of the superior courts, is one of high contempt, and is punishable at the discretion of the judges. If committed in one of the inferior courts, it renders the offender liable to six months' imprisonment, with treble damages to the party injured. 3. Barratry by masters or mariners of ships. This offence is only a subject of importance with reference to marine insurances. From the earliest times a loss by the barratry of the master or mariners has formed a subject of indemnity by underwriters in British policies of insurance. The term barratry in policies of insurance means every species of fraud and knavery in the master or mariners of the ship by which the freighters or owners are injured. Barratry may be committed by a wilful deviation tending to defraud the owner, by smuggling, by running away with the ship, by sinking or deserting her, or by delaying the voyage by any means or for any length of time, with a fraudulent intent.

BARREGE. See **BARÈGES**.

BARREL (*bar*, a stave, the barrel being made of such) is a large wooden vessel for holding liquors. In the old English measures it was used to denote $31\frac{1}{2}$ gallons of wine, 32 gallons of ale, and 36 gallons of beer. But the ale and beer barrels were equalized for every part of England except London by a statute of the 1st of William and Mary, and 34 gallons were made the barrel of beer or ale. The wine gallon, by the statute of Anne, was declared to be 231 cubic inches, and the beer gallon (which did not differ from the ale gallon) was usually reckoned as 282 cubic inches, consequently the dimensions of the four barrels were as follows:—

	Gallons.	Cubic in.
Wine barrel,	$31\frac{1}{2}$...	7316 $\frac{1}{2}$
Ale ditto (London),	32 ...	9024
Ale and beer ditto (England),	34 ...	9588
Beer ditto (London),	36 ...	10,152

A barrel of beer or ale is now understood to mean 36 gallons in all parts of England.

BARREL has another signification, the tube of a Gun, for which see that article.

BARREL-ORGAN, a mechanical wind instrument, in which a wooden barrel studded with metal pegs or staples is turned by a handle, the pegs corresponding with valves admitting air to the pipes. When a given note is required, the peg or staple is driven in at such a place in the barrel as that it shall open its valve and let the particular pipe speak just at that point of the revolution of the barrel; and the length of the peg or staple in the direction of the rotation of the barrel will determine the length of time the valve is kept open, and hence the length of a note. The barrel is marked with lines longitudinal and parallel to the axis, and the pegs driven in along one of these lines will produce notes simultaneously, giving chords; pegs driven in successive lines will produce notes in succession, giving melodies. The same motion of the handle which causes the barrel to revolve also works the bellows of the instrument and supplies wind to the pipes. Such organs have in past times done good service in country churches; but there are few persons of mature years who do not remember mishaps with barrel-organs used in such capacities. It is difficult to decide whether the organ which refused to stop playing or that which refused to play caused most interruption to the worship. But the instrument is now hardly ever used except by

itinerant street musicians, who pay a "padrone" a daily pittance for its hire, and extort more money from those whom they annoy, and who pay them to take elsewhere their monotonous strains, than they earn by the delight they give to urchins and to the poor of crowded "slums." Their use in the streets dates from 1790. Their distressingly mechanical performance is varied a little by the introduction of a melody-stop more piercing than the rest of the organ, and by other means; but no possibility of gaining true musical expression has been found.

The *barrel-piano* or piano-organ has greatly displaced the old barrel-organ of late years. This instrument is of similar construction; but the pegs, instead of opening valves, release detents attached to the hammers of a pianoforte, and allow the released hammer violently to strike the string. Very rapid and brilliant music can be performed, and some of the dance music thus arranged is really effective. By the use of dampers, as in the ordinary pianoforte, and also by the device of having two or three notes in unison at the most important parts of the compass, the tone is somewhat variable. It is manifest that if the note C is in triplicate, three hammers simultaneously striking the three notes of the same sound will give more tone than one hammer striking one of the three. This device also serves another object, for the tone of such pianofortes dying rapidly away, as is the case with all instruments of percussion, it may be sustained by a sharp succession of the several copies of the same note; a continuous rattle of the hammers C₁, C₂, C₃ in succession will give the note C a sustained tremulous effect, not unpleasant if sparingly used. A contrivance worked in the same way by a handle, but differing in some important particulars, has been applied to pianofortes of ordinary construction. Instead of barrels small flat planks or "planchettes" are used in these *mechanical pianofortes*, and they are passed along the top of the instrument by the player in succession. The planchettes carry studs, &c., just as the barrel does, and operate on a mechanism which hangs downwards in the interior of the instrument. In this way the ordinary action of the instrument is still kept in its place, and can be used, though not at the same time as the mechanical action.

Both varieties of barrel-instruments (and especially those of a superior class which are made for private use, playing overtures, &c.) have more than one tune, or have successive portions of the same tune on the same barrel; and matters are so arranged that the barrel after one complete revolution is driven to the right by a strong spring just so far as to catch the next circle of pins in its second revolution. If, however, it is desired to repeat the same tune, the same circle of pins may be brought into play again, by the barrel being checked from shifting in a simple manner. When the tunes have been all played through successively the barrel will have shifted to its utmost, and is then returned to its first position by a strong spring at the opposite end to the first-named spring, and so is ready to begin the series afresh. The better instruments have removable barrels, and are provided with separate barrels containing fresh tunes to take their places as desired. Some of these instruments are very costly, have several barrels moving at once by clockwork, and attempt the imitation of an orchestra; indeed, as much as £1500 is charged for a good "orchestration." Such elaborate constructions, however, although in their main principles the same, can hardly be classed with barrel-organs.

BARREN LAND, in agriculture, is that in which the plants generally cultivated do not prosper or arrive at maturity. This barrenness may arise from various causes. The texture of the soil may be such that the moisture essential to vegetation cannot be retained, or that the fibres of the roots cannot penetrate in search of food. The first is the case in loose silicious sands, the second in rocks and indurated clays. It is seldom that either of these soils can

be rendered productive so as to repay the expense of cultivation, unless under particular circumstances. The most barren sands will become productive by irrigation, and in that case the labour applied to improve their texture, by the admixture of more tenacious earth, may be fully repaid. The vine may be made to grow in the fissures of the hardest rocks, where the climate is favourable; and terraces may be formed by which the soil brought on them may be retained—a notable instance of which is the well-known Rheingau, or wine-producing district along the Rhine, where the soil is yearly replenished by earth carried up in baskets, and retained from being washed away by the rain by means of hurdles, dwarf walls, &c., in the most curious manner. But, in general, loose sands and rocks ought to be left to their natural state of barrenness.

There are, however, in all countries tracts of land which are barren and waste in their present state, but which, for want of better soils to employ and feed an increasing population, are well worth improving, and will ultimately repay the labour bestowed on them. According to the official agricultural returns issued in 1885, it appears that in that year the proportion of land cultivated in the United Kingdom was as follows:—

	Total Area in Statute Acres.	Total Acreage under Crops of all kinds.
England, . . .	32,597,398	24,736,000
Wales, . . .	4,721,823	2,793,000
Scotland, . . .	19,466,978	4,783,000
Ireland, . . .	20,819,829	15,212,000
Isle of Man, . .	145,325	96,000
Channel Islands, .	48,322	30,000

The differences between these columns show the extent of barren land. Looking at this table, it is impossible not to ask whether so very large a proportion of the surface of the British dominions in Europe may not remain uncultivated more from want of industry and skill than from insuperable barrenness.

The most prevalent causes of barrenness in possibly improvable land are a deficiency or an excess of water, the methods of remedying which are explained under **IRRIGATION** and **DRAINING**. Supposing that the moisture has been regulated, and that the land is to be brought into cultivation, the first thing to be done is to remove obstructions and impediments, whether they be rocks, stones, trees, or shrubs, or only the heath and coarse grasses which generally cover waste lands. Rocks may be quarried or blown to pieces, and so may stones too large to be removed whole. If the nature of the stones is lamellated, and they will split, wedges of soft iron driven into holes made in the direction of the layers readily divide them into flat pieces extremely convenient for use in making roads, walls, &c. Trees must be grubbed up by the roots, and it saves labour to cut the roots below the ground while the tree is standing, and draw the tree over by means of ropes fixed to the top; the stem becomes a lever by which the roots are more easily drawn out. Useless shrubs are readily cut down, and serve for fuel, and their roots are seldom difficult to grub up by means of a strong iron three-pronged fork.

There are two methods by which the heath and grass of the surface may be got rid of—by mowing them close to the ground and ploughing in the roots, or by paring the surface and burning it. If the soil consists of clay or loam containing the yellow ore of iron, and if the ashes, after the sods have been burned in heaps, are of a bright red colour, the effect of burning the surface will be generally advantageous, even where the soil is already deficient in vegetable matter. But if the soil is a sharp sand, and the

ashes are white and loose, burning destroys the small portion of clay and vegetable matter in the soil, without compensating the loss by any advantage, and in this case burning the surface is inexpedient. The roots of the heath must be grubbed up by spades and mattocks, or by means of a strong plough: they may then be gathered and burned; but the grass must be ploughed in, and not too deep at first, that it may soon rot: a coating of lime ploughed in will accelerate the decay of the grass. This kind of soil requires the addition of vegetable and animal matter to supply the principles in which it is deficient, and the chief attention must be directed to this object.

When the surface is very uneven, so as to form hillocks and hollows, in which the water is apt to stagnate, levelling is a necessary process. The most effectual way of doing this is by the wheel-barrow and shovel; but if the soil is loose and sandy it may be best done by means of the *mollebart*, a Flemish instrument, consisting of a kind of large shovel, drawn along by a horse and guided by a man. The small fields of Flanders are often levelled by this means. In France a somewhat more complex kind of *mollebart* has been patented.

The land being now inclosed, fenced, and drained where requisite, obstacles to the plough removed, and in a tolerably level state, it remains only to consider how it may be most advantageously cultivated, so as in the end to repay the first and great outlay. Some lands which have lain waste for ages, for want of a proper spirit of enterprise, are found to consist of a tolerable depth of moderately fertile earth. These must be treated like a garden newly formed, and trenched as deep as possible; mere exposure to the air and frost will often make them highly productive, and in this case the only caution necessary is not to exhaust them at first; on the contrary, their fertility should be increased by such crops and manuring as will always restore more than has been consumed by vegetation. Lime excites new land wonderfully, and no manure is more active, provided there be vegetable matter in the soil (or added at the same time), which the lime renders soluble and active. Bone-dust and ashes are also useful on new land.

Some soils, such as that of Bagshot Heath, consist of a loose sandy surface soil, beneath which is an impervious stratum called the *iron pan*, formed by the deposition of iron particles from the sand. Until this pan is broken through, the ground cannot be made fertile; but by trenching, neutralizing the salts of iron with lime or chalk, manuring, marling, ploughing, and a course of turnip husbandry, many portions of Bagshot Heath have been brought into a thriving state. Many of the formerly poor lands of Flanders have been rendered most fertile by pasturing cattle upon them from a neighbouring farm; and it is agreed that animal manure is the best of all agents for this work, aided by paring, burning, marling, and other operations. Where manure is not abundant it is deemed better to grow common broom or furze for the first year or two, and not apply animal manure till a foundation of decayed vegetable refuse has been incorporated with the soil. Poor, wet, stiff lands must be divided by deep ditches, ploughed in high ridges, and be as much as possible exposed to the wind and frost. Instead of turnips, grasses must be sown, such as suit the soil. Paring and burning the surface are here generally useful in the first instance, and may sometimes be repeated with advantage.

There is another kind of barren soil which extends over large tracts. [See BOG, MOOR, PEAT.] Some soils are rendered infertile simply by the presence of some noxious ingredient, such as an acid. In such case it is necessary to apply lime, or some other ingredient that will neutralize the acid.

The unproductive state of waste lands in many populous countries has suggested the employment of the poor and friendless on their improvement, and it has been thought

a more enlightened charity to expend the money, which would otherwise be given in simple temporary relief, in such a manner as to make the labour of paupers available to their future comfort and independence. The noble conclusion of the second and concluding part of "Faust" will occur to the mind in connection with this, where Goethe shows his hero, after using his limitless power for every other purpose, finding his only true happiness in such beneficent work. In some places portions of land have been given over absolutely, or at a nominal rent, to paupers, in order that they might cultivate and gradually improve them; and where the soil is naturally good, and requires only to be worked and tilled, the plan has been attended with great success. But where a barren waste can only be improved by artificial manures and expensive operations, it is folly to expect this to be done by labour alone, without considerable capital. In these cases, therefore, the labour would necessarily be combined and controlled. Plans for using the non-productive classes of criminals, and of soldiers in peace time, in such operations are from time to time brought forward; but practical difficulties have as yet prevented them from being carried out.

BARRÈRE DE VIEUZAC, christened by Burke the "Anacron of the Guillotine," was born at Tarbes in the Upper Pyrenees, 10th September, 1755. He was an advocate by profession, and soon displayed his own peculiar talent, the gift of mellifluous speech, which gained him some local notoriety, and caused him to be sent by Bigorre as one of its representatives to the States-general of 1789. In 1792 the department of the Upper Pyrenees elected him to the National Convention. At first a Girondist, he soon became aware of the greater influence of the party of the Mountain; and anxious only to be on the winning side, he at once seceded to it. By his florid eloquence and ready pen he assisted to carry out the most extreme measures of the Reign of Terror. He was president of the Convention at the trial of Louis XVI., and voted for his death without appeal and without delay. He complimented and supported Robespierre all through the period of his power, but on his fall exceeded his bitterest enemies in his denunciation of the fallen tyrant, and voted for his execution without a hearing. After the fall of the Convention he was tried as a Terrorist, and sentenced to deportation, and for some years lived in retirement. Napoleon Bonaparte, on his accession, permitted his return, and retained his assistance while he remained in power; but on the fall of the empire Barrère turned Royalist. Nevertheless in 1815 he was banished from France, and lived at Brussels till 1830, employing himself in literary work. He returned to France in 1832, and was once more elected as a deputy by the department of the Hautes Pyrenées; but his election being on formal grounds annulled, he was appointed a member of the administration of that department, which office he retained until 1840. He died on 14th January, 1841, at the age of 85 years. His "Mémoires" were published in 1842 by M. Hippolyte Carnot. His character has been described by Macaulay "as approaching nearer than that of any person mentioned in history or fiction, whether man or devil, to the idea of consummate and universal depravity." There can be no doubt that he was one of the most cowardly, selfish, and cruel of those who gained ascendancy during the Reign of Terror, and was guilty of unbounded sensuality and deception. Mercier called him "the greatest liar in France;" and certainly when we consider the gigantic lie of the sinking of the *Vengeur* with all the crew crying "Vive la République!" rather than yield themselves prisoners to the English (conclusively shown by Carlyle to be a mere fiction of this man's), we must admit him to be a magnificent artist in mendacity; for this supreme "blague" was accepted until a few years back as veritable history, and was to be found in all the gravest books.

BARRHEAD, a thriving manufacturing town of Scot-

land, in the county of Renfrew, on the banks of the Levern, where it issues from a highly picturesque glen in the neighbouring hills. It is 3 miles S. of Paisley, and 9 from Glasgow on the railway to Kilmarnock. The chief industrial occupations are the printing of shawls and calicoes, cotton spinning, dyeing, bleaching, iron and brass founding, and machine making. It is connected with the neighbouring villages of Grahamston, Arthurlie, and Newton. The population in 1871 was 6503, and 6728 in 1881.

BARRICADE is a French word, used as a military term for an obstruction formed in the streets of a town, or on the roads in the country, in order to check the advance of an enemy. It comes from the Spanish *barricada*, of like meaning—the Spanish *barriaca*, a barrel, indicating the original material of barricades, viz. barrels full of earth. The more important barriers are constructed of palisades planted in the ground, strengthened by struts, and rendered proof against shot by means of sand-bags, or of gabions filled with earth. Loopholes are cut for the purpose of firing through them. Barricades on roads are sometimes of a similar kind, but they are generally formed of such materials as are at hand. Posts planted in the ground, with field-gates or hurdles, against which earth is thrown, are used; and often a line of loaded carts or felled trees forms the only obstacle to the enemy besides that which is created by the fire of the defenders. Barricades have been made use of in street fights since the middle ages, but they are best known in connection with the revolutions in Paris. During the wars of the League in 1588 the people made barricades by means of chains, casks, &c., and compelled the royal troops to retire. During the war of the Fronde another barricade was erected in Paris on 27th August, 1648. Barricades composed of overturned vehicles, the stones of the paved streets, &c., to the extent of several hundreds, were erected in Paris in the insurrections of July, 1830, and June, 1848.

On the last-mentioned date the fighting was very severe, and General Cavaignac stormed the barricades on behalf of the Provisional Government, killing and wounding about 16,000 of their defenders, and taking 8000 prisoners. The damage and loss occasioned by three days' fighting were estimated at not less than £1,200,000 sterling. The Emperor Napoleon III., in the extensive alterations which he made in Paris, took measures for making these street fights more difficult and dangerous to the populace. The removal of the narrow and crooked streets, and the opening out of wide, straight boulevards, and the substitution of asphalt for paving stones, which were carried out during his reign, were regarded as rendering barricades impossible. These expectations were falsified, however, by the Commune in 1871, when barricades of an elaborate construction were erected and fiercely defended, their capture causing heavy loss to the Versailles troops in their efforts to gain possession of the city. Barricades are sometimes stormed from the front, but are more easily taken, as a rule, by breaking through the houses in the neighbouring streets and attacking the defenders from the rear. Sometimes a temporary barricade is thrown up in line with that held by the insurgents, from behind which the attacking troops may exchange shots with the defenders, or it may be approached by means of the roofs of the houses round about; but where artillery is available that, of course, is the quickest agent for destroying these lastly erections.

BAR'RIER (from the French word *barrière*), in fortification, is a term applied to a chain of military posts protecting the frontiers of a country. It signifies also a wall of strong timbers inclosing an area [see *STOCKADE*] or protecting a passage. In some part of a barrier is a gate usually formed of two parts, opening in the middle, and frequently musket-proof, being made of strong timbers in vertical and horizontal positions, with diagonal braces.

BAR'RIER ACT, the name of an Act of the Assembly

of the Scotch Presbyterian Church to prevent hasty legislation (1697). The terms of the Act demand that all changes proposed by the Assembly in the laws of the church shall first be submitted to the presbyteries before they are carried into effect.

BAR'RIER REEF, THE GREAT. A coral reef extending about 1200 miles along the N.E. coast of Australia, from lat. 23° S. to Torres Strait, at an average distance from the shores of between 20 and 30 miles, and in some parts from 50 to 70 miles. There are very few breaks in its continuity, and in some places it is enlarged into small islands. Close outside the sea is exceedingly deep; the belt of ocean inside varies from 10 to 25 fathoms, averaging 12 fathoms, and affords anchorage throughout on a sandy bottom. The depth varies, however, with the breadth, and increases towards the south end to 40 and even to 60 fathoms, where the distance from the land is greatest. Its outer edge, which is higher than the inner, is beaten upon by a constantly heavy surf, while the water is comparatively calm inside. This circumstance, and the possibility of anchoring in almost any part, renders it the most eligible route for vessels passing north and south along the coast, though the navigation is somewhat intricate, from the number of islands dotting the surface. The safest passage through the reef for ships entering from the north is the Pandora, in lat. 11° 35' S., lon. 144° E.; and here, on Raine's Islet, a beacon 40 feet high has been raised; there are several others, however, and a great many narrow gullies, besides unfit for the passage of any vessel. The "inner route" is entered from the south by Capricorn Channel, 60 miles wide, and lying between Port Bowen and the south end of the reef.

BARRIGUDO (*Lagothrix barriguda*) is a monkey, one of the family Cebidae, inhabiting the forests of the Upper Amazons. Its habits have been described by Bates in his "Naturalist on the Amazons." They are active during the day, living in troops and travelling from tree to tree, making occasional raids upon plantations. A barrigudo measured by Mr. Bates was 27 inches in length, with a tail 26 inches long, being one of the largest monkeys he had seen in America. They are strong bulky animals, the "big-bellied monkeys" of the Portuguese colonists. The tail is flexible and furnished underneath with a naked palm, like a hand, for grasping. Bates says that the skin of the face is black and wrinkled, the forehead low, with the eyebrows projecting, and that the features altogether resemble in a striking manner those of an old negro. The flesh is greatly relished, as many as 1200 of these monkeys being annually destroyed by a tribe of Tucuna Indians numbering not more than 200.

BAR'RING-OUT, a practice formerly common in schools, and maintained until quite recently in some in the north, "by which," as described in Dr. Johnson's "Life of Addison," "the boys, when the periodical vacation drew near, growing petulant at the approach of liberty, some days before the time of regular recess took possession of the school, of which they barred the doors, and bade their master defiance from the windows."

This singular custom long prevailed in many public schools, and in the statutes of Wotton School, near Northwich, in Cheshire, founded by Sir John Deane A.D. 1558, its observance by the scholars is directed.

BAR'RISTER. The etymology of this word has been variously given. In French the word *barreau*, which signifies a bar of wood or iron, is also used to signify "a place in the audience where the advocates plead, and which is closed to prevent the press of people" (Richelet, "Dictionnaire"). From the word *bar* such a term as barrister may have been formed. But in England it is said that the term barrister arose from the arrangement of the halls of the different Inns of Court. The benchers and readers, being the superiors of each house, occupied on public

occasions of assembly the upper part of the hall, which was raised on a *dais*, and separated from the rest of the building by a bar. The next in degree were the *utter* barristers, who, after they had attained a certain standing, were called from the body of the hall to the bar (i.e. the first place outside the bar), for the purpose of taking a principal part in the meetings or exercises of the house; and hence they probably derived the name of *utter* or *outer* barristers. The other members of the Inn, consisting of students of the law under the degree of *utter* barristers, took their places nearer to the centre of the hall and further from the bar, and from this manner of distribution appear to have been called *inner* barristers. The distinction between *utter* and *inner* barristers is at present abolished; the former are called barristers generally, and the latter are called students.

Previously to a general arrangement made by all the Inns of Court in 1762, the qualifications for being called to the bar varied extremely. But it was determined in 1762, by all the Inns of Court, to adopt a common set of rules in this respect; and under these rules, which were slightly modified by the different Inns of Court from time to time, the only qualifications required, until quite recently, were that a person should be twenty-one years of age, and have kept twelve terms by eating the number of dinners during term necessary to constitute keeping that term. The candidate must thus have been three years a member of the society to which he belonged, and during that time he was required to go through certain formalities, called keeping exercises, which meant nothing. No knowledge of the law was required, but the candidate must have been able to write his name, and either to read writing or to recollect some words of his exercise. By an order made by the benchers of the Inner Temple, in Trinity Term, 1829, every person proposed for admission to that house must, previously to his admission, have undergone an examination by two barristers appointed by the bench, who were required to certify whether the individual was proficient in classical attainments and the general subjects of a liberal education. This regulation was never adopted at any of the other three Inns of Court; it was felt, or supposed to operate, as a restraint upon the resort of students to the Inner Temple, and to create a consequent diminution in its funds. The rule was abandoned in 1847.

In 1852 the four societies agreed upon a new set of rules, by which the previous rules were almost entirely re-enacted. A student is now compelled to attend two of the five courses of lectures delivered at the halls of the Inns of Court, during one whole year; the year being divided for this purpose into three educational terms. He may, however, avoid the attendance by submitting himself to an examination in law.

The chief business of the bar is the advocacy of cases in open court, for which they enjoy special privileges and powers. Every barrister has a right to practise in any court in his country. In pleading he may state anything communicated to him by his client relative to the case, and he cannot be held liable should the matter reflect upon another, and in the event be proved to be false. But this freedom does not extend to the publication of a counsel's statement by a third party; and a barrister may be held liable for any injurious untruth invented by himself or introduced in his pleading without relevancy to the case at issue. Misconduct on the part of a barrister in conducting a case may bring him under punishment by order of the court; but the usual course is for the benchers of the Inns of Court to which he belongs to sit in judgment upon him, and should the offence require it, to disbar him or expel him from the profession. Dr. Keenly (defender of the Tichborne claimant) was the last prominent counsel disbarred. In addition to advocacy, the barristers form the chief conveyancers in connection with English law, and they perform a very useful function in giving advice upon

points of law. A "counsel's opinion" is often the means of settling a dispute without litigation, or serves to guide a bewildered layman in the intricacies of British law.

It is from the bar that all the judges for the superior courts of law and equity are selected, and nearly all the magistrates of the inferior courts are appointed from the same source. See COUNSEL, INNS OF COURT.

BARRISTER, in Scotland. See ADVOCATES, FACULTY OF.

BAR'ROW, a burial mound. The word should be really *berrow*, but like *parson* for *person* it has suffered vowel change in the course of time. It is the modern version of the Old English (Anglo-Saxon) *beorg*, a grave-mound, from *beorgan*, to hide or protect, hence to *bury* in the ground. These artificial mounds of earth, of various sizes and forms, are found in many parts of the globe, and are tombs or sepulchral memorials of persons of distinction or of warriors slain in battle; but they are especially common in Norse countries, or countries invaded by northern peoples. The Latin name for barrow is *tumulus*, meaning "a little hill."

The first careful investigations into the tumuli of this country were made by Dr. Stukeley in the neighbourhood of Stonehenge above a century ago. In the densely-peopled districts barrows have mostly disappeared; but in the counties of Wilts and Dorset, and parts of Hampshire, they are scattered over the open downs, and crown the more elevated ranges of hills which are yet untouched by the plough. Dr. Hoare's "Ancient Wiltshire" (published 1820) is also an authority on the subject.

The remains found in the Wiltshire barrows are believed to indicate three distinct stages or eras of society. The first was before the introduction of metals, when arms and instruments consisted of spear-heads of flint, and arrow-heads of flint or bone; the second when these articles were of brass; and the latest, when iron instruments, arms, and utensils accompany the deposit. Of the sepulchral urn, of which a great number have been found in the tumuli, there are two varieties, indicating different periods of mechanical art. See AGES OF THE WORLD.

The largest barrow in England is the lofty one at Silbury, the base of which covers more than 5 acres. Many similar mounds, of vast size, exist also in Central America.

BAR'ROW, the second river in Ireland, has its source in the Slievebloom Mountains, in Queen's County, a short distance N.W. from Mountmelic. It flows first to the east, through the town of Portlarnet to the borders of the county of Kildare at Monasterevan, and then, taking a direction nearly south, it divides King's County and Queen's County from Kildare. Still flowing southwards, it passes through the county of Carlow, and afterwards forms the line of separation between Wexford on the east and Kilkenny and Waterford on the west, and joins the sea at Waterford harbour. At Ringwood, 2 miles above the town of New Ross, the Barrow receives the Nore, when its volume is nearly doubled; and their united stream is afterwards augmented by the Suir, which joins it to the east of the city of Waterford. The junction of both these streams with the Barrow takes place on its right or western bank. The Barrow is navigable to Athy, in the county of Kildare, about 65 miles in a direct line from its mouth; and the communication is afterwards continued to Dublin and other parts by means of a branch of the Grand Canal. Vessels of 200 tons burden can ascend the river 25 miles to the town of New Ross, which by this means is enabled to carry on an export trade in agricultural produce. A considerable bar, which occurs just below the junction of the Barrow and the Nore, prevents the further passage of vessels of any great burden, except at certain states of the tide. The trade higher up is carried on by means of barges; and great quantities of corn and butter are thus annually sent down to Waterford for exportation. Much expense has been incurred in the improvement of the navigation of the

Barrow, and the increase of the downward trade in consequence has been great. A large area of land has also been reclaimed.

BAR'ROW-IN-FURNESS, a seaport, manufacturing town, and municipal borough of Lancashire, is situated on Barrow Head, opposite Walney Island. It is 268 miles from London by the London and North-western, or Midland and Furness railways, 8 miles S.W. from Ulverstone, and 35 miles by railway W.N.W. from Lancaster.

Barrow-in-Furness presents the most remarkable instance of rapidity of growth of any town in the United Kingdom, or perhaps in Europe. There are those who remember well when its population was not more than fifty, it being then a little village of three or four small farms, eight or ten cottages, and a couple of public-houses on the extreme end of the Furness promontory. The population in 1847 is said to have been only 325; in 1857 it numbered more than 2000, and in 1864 it had increased to 10,608; at the census taken in 1871 the number of inhabitants was 18,245, and in 1881 it had increased to 47,259. The town received a charter of incorporation in 1867, when a council of sixteen was granted, but that number was doubled by an Act passed in 1875.

The district was formerly known as Lancashire-across-the-Sands, this having been the only means of access to Barrow, and the one preferred even after the formation of a turnpike road, the latter making a very tedious circuit. The great impetus to the extraordinary growth of the town was the formation of the Furness Railway, and the development of its abundant wealth of iron ore, of which Barrow is now the greatest entrepôt in England.

In 1835 about 20,000 tons of hematite iron ore were raised here, and the railway company, in their prospectus, estimated that 100,000 tons would be conveyed annually from the district. This was thought by many at the time to be an exaggerated estimate; but within three years the quantity of ore exported from Barrow increased to 130,000 tons, within five years to 250,000 tons, and in less than ten years from the opening of the railway it had risen to 450,000 tons. There are now twelve blast furnaces at work, manufacturing 6000 tons of pig-iron weekly, and the annual export of hematite iron ore is 800,000 tons. The ore yields an average of 57 per cent. of iron. Bessemer steel of a superior quality is made, the Barrow Hematite Steel Company alone manufacturing 300,000 tons per annum. More than 3000 tons of copper ore is annually exported, and a considerable quantity of slates. Coal from Wales, and timber from Canada and the Baltic, are the principal imports.

The docks of Barrow, the finest of any on the coast except those of Birkenhead, are of singular construction. Divided from the village of Barrow-in-Furness by a narrow stream was a little island called Old Barrow. The railway company, assisted by the principal land-owners, the Dukes of Devonshire and Buccleuch, gradually reclaimed part of this narrow channel, and converted the remainder into docks and basins, in which vessels can ride securely in the roughest weather at all times of the tide. The first, or Devonshire Dock, opened September, 1867, has a water area of 30 acres, a depth of 22 feet, and an entrance 60 feet wide. Divided from this one by a massive stone wall, known as the Town Pier, is the Buccleuch Dock of 33 acres, and a timber pond of 85½ acres immediately adjoins. There are 1½ mile of stone quays, 100 acres of wharves, extensive ranges of warehouses, four stories high, fitted with hydraulic capstans, cranes, &c., and about 230 acres set apart for shipbuilding, timber yards, and iron-works. The works embrace about 10 miles of railway sidings, and the docks alone have cost £300,000. The Ramsden Dock, built 1873-75, is no less than 200 acres in extent, and of sufficient depth to admit the largest sea-going steamers at any state of the tide.

Barrow was constituted a port for customs purposes in 1872. The number of vessels registered as belonging to the port in 1883 was 150 (50,000 tons). The entrances and clearances average 2000 (500,000 tons) per annum.

In addition to its enormous trade in iron and steel, during the past few years iron shipbuilding, railway rolling stock manufacturing, flax and jute, steel wire, and timber and saw mills have been added to the list of industries carried on in Barrow.

The town of Barrow-in-Furness is built on a regular plan, mostly rectangles, and consists of a number of streets of substantially built houses, well drained, and having a good supply of water. It contains a town-hall of large dimensions and admirable design (erected in 1879, and which has a very handsome central tower), churches, chapels of various denominations, yacht club, schools, banks, hotels, exchange, working men's club and institute, large news-rooms and public library, temperance hall, assembly room, &c.

The interesting ruins of Furness Abbey, founded by Stephen in 1127, are within the borough, although two miles from the heart of the town. They are most picturesque, situated in a small wooded valley.

BARROW, ISAAC, was the eldest son of Thomas Barrow, descended of a respectable Suffolk family. He was born in 1630, and was placed first at the Charterhouse, and afterwards at Felstead School in Essex. He went to Trinity College, Cambridge, in 1647.

Barrow was led to mathematical studies instead of beginning by them. On his accession to a fellowship he began to study theology, and found by his own wants that a divine must be a chronologist, a chronologist an astronomer, and an astronomer a geometer. To the mathematics he therefore applied himself. He had in the meanwhile, as all his writings show, closely studied the learned languages, so that, on the resignation of the Greek professor, he was recommended to that chair. This he did not gain, being known for a Royalist and suspected of Arminianism; and the disappointment, together with the unfavourable character of public events to his views, indeed him to go abroad. He travelled (1655-59) through France and Italy to Smyrna and Constantinople, thence again to Venice, and through Germany and Holland home. After his return he was ordained, a little before the Restoration. The neglect with which he was treated after that event, and the distich in which he celebrated it,

"Te magis optavit reditulum, Carole, nemo,
Et nemo sensit te redisse minus."

as well known; but in 1660 he was chosen Greek professor at Cambridge, and in 1662 Gresham professor of geometry. This last he resigned in 1664, holding its duties to be incompatible with those of the Lucasian professorship, to which he was appointed by Mr. Lucas at the institution of that chair in 1663; and this again he resigned in 1669 in favour of a pupil, a young man whom he considered as of the highest promise, aged 27, and named Isaac Newton; indeed his whole history is one of resignations of profit upon principle. He had previously been offered a good living upon condition of instructing the son of the donor; he rejected the offer as simoniacal. His uncle gave him a small living in Wales, and Dr. Seth Ward, bishop of Salisbury, made him one of the prebendaries of that cathedral. He applied the revenues of both preferments to charitable purposes, and resigned them when Charles II., in 1672, appointed him master of Trinity College. In this capacity he exerted himself to build and form a library, the want of which had been long felt. In 1675 he was appointed vice-chancellor of the university, and two years later died, at the early age of forty-seven. His manuscripts he bequeathed to Tillotson (afterwards archbishop), and Abraham Hill, his biographer. His energy

of mind is sufficiently attested by the quantity of his writings—by the successful variety of his studies—by the extraordinary opinion of him formed by his associates, when compared with the degree of interest his writings present to posterity; which is always, in our opinion, proof of a lustre cast upon writings by personal character—and by the erection of Trinity College Library above mentioned.

Of his mathematical works the principal are the "*Lectiones Opticæ*," and the "*Lectiones Geometricæ*," which have been pronounced by an excellent authority to form "a mine of curious and interesting propositions to which geometry is always applied with peculiar elegance."

Barrow produced in a geometrical form that prelude to the differential calculus which goes by the name of the "method of tangents." It was, in point of fact, what was afterwards the fundamental notion of the differentials of Leibnitz, and in Newton's language asserted the ultimate equality of the ratio of the differences of two ordinates and abscissæ to that of the ordinate and subtangent.

The character of Barrow as a theological writer has always stood high among the English divines. His sermons, as Le Clerc observes, are rather treatises and dissertations than harangues; and he wrote and rewrote them three or four times. They are always cited as exact and comprehensive arguments, the produce of a grasp which could collect and combine all that was to be said upon the subject in question.

An edition of his theological works was published by Napier in nine volumes (1859). The latest edition of his chief mathematical works is that published by Whewell (London, 1861).

BARROW'S STRAIT, which connects the Arctic Ocean with the north-west part of Baffin's Sea, was first discovered by Baffin in 1616, who, however, supposing the land to be continuous, gave it the name of Lancaster Sound. It was explored in 1819 by Captain Parry, who named it Barrow's Strait, from John Barrow, secretary of the Admiralty, a zealous promoter of north-west discovery. The strait is about 250 miles in length, and from 30 to 45 in breadth. Both shores are steep and cliffy, and the water of a great depth. The icebergs in the strait are very large. The parallel of 74° N. lat. runs through the strait.

BAR'RY, COMTESSE DU (Marie Jeanne Gonnard de Vaubernier), was born in the year 1744. Her reputed father, Vaubernier, was an exciseman. Having gone to Paris with her mother, a milliner, when she was about fifteen, she became acquainted, under the assumed name of Mlle. Lange, with Count Jean du Barry, a fashionable rake of his day, who made her his mistress for a short time, and afterwards introduced her to Lebel, valet-de-chambre to Louis XV., by whom she was presented to the king. She at once captivated the licentious monarch, although he perfectly well knew that she had led the most infamous of lives amongst the most abandoned men of the day. He wished her to have a title, in order that she might appear at court, and Guillaume du Barry, Count Jean's brother, consented to lend himself to the wish of the king by marrying her, after which she was introduced to the court at Versailles as Comtesse du Barry in 1769. General Dumouriez has recorded his shame and sorrow at seeing, "at Compiègne, the old king of France, on foot, with doffed hat, in sight of his army, at the side of a magnificent carriage, doing homage to the Dubarry" ("*Vie de Dumouriez*," Paris, 1822). The court of France during the regency and the subsequent reign of Louis XV. was the abode of the most barefaced profligacy. Everything was sold and everything was obtained through the intrigues of vicious women. When Louis XV. died in 1774, the Comtesse du Barry was shut up in a convent near Meaux; but some time after Louis XVI. allowed her to come out, restored to her the residence of Luciennes, which had been built for her by the old king, and allowed her a pension.

It was for Du Barry's neck that the fatal diamond necklace was planned, which when complete so fearfully contributed to the dishonouring of Queen Marie Antoinette, who, although quite blameless in that matter—the unconscious tool and victim of scoundrels—never recovered the high unsullied fame she had up till that time worthily possessed among her people. After this wretched creature also the exquisite colour “rose du Barry,” for which Sevres porcelain is so famous, was named. She was almost forgotten when the Revolution broke out; but she then showed herself grateful for the treatment which she had experienced from Louis XVI., and she repaired to England, careless of danger, in 1793, in order to sell her jewels, the produce of which she intended for the use of the queen and her children, who were then prisoners in the Temple. On her return from England she was brought before the revolutionary tribunal, on the charge of “being a conspirator, of having furnished émigrés with money, and of having worn mourning in London for the death of the tyrant.” She was condemned, and executed, 6th November, 1793.

BAR'RY CORN'WALL. See PROCTER.

BAR'RY, SIR CHARLES, the distinguished architect of the two Houses of Parliament at Westminster, was born in London, May, 1795. Educated at private boarding schools in Leicestershire and Bedfordshire, he was afterwards articled to Messrs. Middleton and Bailey, architects, Lambeth. In 1817 he went to Italy to improve his knowledge by the inspection of its wonderful works of art, and whilst there he attracted the notice of a wealthy Englishman, who was so pleased with the grace and vigour of his designs that he took him as a travelling companion through Greece and Egypt. On his return to England he became the successful competitor for the design of the Church of St. Peter at Brighton, which formed his first work of an important character. This design was chosen by the Church Building Commission for their seal on account of its beauty, and its conception proved the commencement of a brilliant career. To his fertile and original genius England is indebted for many noble architectural works. Among these may be mentioned the Manchester Athenæum, a building in the Grecian style; King Edward VI.'s Grammar-school at Birmingham, one of the finest of his productions; and the College of Surgeons, the Reform Club, and the Travellers' Club, in London. He was also the architect of the Earl of Ellesmere's mansion, facing the Green Park; but his greatest work was the Westminster Palace. After the destruction by fire of the old Houses of Parliament in 1834, designs were invited by the government for the erection of a new building, and in the public competition which followed Barry's received the award. The work was commenced in 1840, and on the opening of the Victoria Tower in 1852 by the Queen he received the honour of knighthood. He was a Royal Academician, a fellow of the Institute of British Architects, of the Royal Society, and of the Society of Arts. He died at Clapham, 12th May, 1860, and was buried in Westminster Abbey.

BARS, a province of Hungary, containing an area of 1011 square miles, is bounded N. by the county of Thurocz, E. by those of Honther and Zolyom or Sohl, S. by those of Comorn and Gran, and W. by that of Neutra. The northern districts are very mountainous, as they are crossed by the Kyan range of the Carpathians; this range is said to afford the finest gold in Europe. South of it are the Schwanitz and Pakantz chains, which extend to the banks of the Gran. Another branch of the same range extends in a southerly direction as far as the mountains which divide this circle from those of Gran and Comorn. But in general the whole of Bars south of Lewenz is a complete level. The principal rivers which water this county are the Gran, the Zsitva or Sitva, and the Neutra, all of which fall into the Danube. Among many minor streams

is the Kremnitz, which impels several works on its banks. The soil in the north affords good pasturage to great numbers of horned cattle and sheep; in the south, where much grain and some wine are produced, it is extremely fertile. Gold, silver, malachite, copper, and iron ore are found near Königsberg and Kremnitz. Amethyst, chalcodony, carnelian, semiopal, jasper, agate, crystal, obsidian, syenite, porphyry, basalt, mill-stone grit, &c., are also among the mineral products. There are warm sulphuretted waters at Skleno, and chalybeate springs are found at Eisenbad. The population of Bars is about 136,000. Some Gypsy tribes roam through the country as tinkers, &c.

BARS, from which the county takes its name, is a market-town on the Gran, and was once a celebrated fortress, better known under its German designation, Bersenburg.

BAR-SUR-AUBE, a town of France, in the department of Aube, and the capital of an arrondissement of the same name, is situated on the right bank of the Aube, 28 miles east of Troyes. The town is pleasantly situated among the vineyards of the Aube, and had 4400 inhabitants in 1882. There is a college, a tribunal of first instance, two churches, and an hospital in the town, which also possesses a fine horticultural establishment. The chief industrial products are calicoes, linen, paper, brandy, and vinegar; there is also a good trade in corn, wine, wood, hemp, and wool. The Aube is crossed by a stone bridge, upon which a chapel was erected to mark the spot where Charles VII. caused the Bastard de Bourbon, who had revolted against him, to be broken on the wheel, and his body, sewn up in a sack, to be cast into the river in 1416.

An important and hard-contested action was fought here on 27th February, 1814, when the allies, under Schwartzberg, retreating before the French general Oudinot, turned round and made a stand, the result of which was that the French were obliged to retire across the river, having lost 3000 men, and the allies 2000. Schwartzberg and Wittgenstein were both wounded here. Two days before a conference of the ministers of the allied sovereigns was held at Bar, in which the firmness of Lord Castlereagh in refusing the English subsidies to Bernadotte, who was hanging on the French frontier unwilling to take a part in the invasion of France, unless he detached two corps of his army in support of Blücher, contributed in no slight degree to decide the wavering policy of the allies, and to bring the war to an end. These reinforcements, thus extorted from the Swedish army, enabled the allies to fight the battle of Laon, and put a stop to Napoleon's efforts to arrest the march of the allies on Paris.

BAR-SUR-SEINE, a town of France, in the department of Aube, and the capital of an arrondissement of the same name, is 19 miles S.E. of Troyes, on the left bank of the Seine, which is here crossed by a handsome stone bridge. This pleasant town is well built, and stands in the midst of a district covered with vineyards. The chief trade of the town is in corn and wine. The population in 1882 was 3000.

BAR'TER is the exchange of one thing for another. The term is properly applied only to the exchange of movable things. Barter, of course, implies that there are two persons who exchange, and two things or two sets of things which are exchanged against one another. Each person transfers to the other the ownership or title that he has to the thing which he parts with. Barter is simply the giving of one movable thing for another, without reference to any standard of value. When a man gives anything for the precious metals in the form of coin, or for a promise to pay in the precious metals in the form of coin, or for paper money which has an ascertained value in specie, the transaction is a sale. There is no sale without a price, that is, a money value, which is given on the one side as an equivalent for something, not money, which is given on the other side.

If two persons exchange things with reference to a money value, as if one man gives £100 worth of wheat at the current price for £100 worth of cotton wool at the current price, the transaction is still exchange or barter; the price has only been used as a means of making the exchange a fair transaction.

Pure barter only takes place among barbarous nations, or between barbarous people and the traders of civilized nations. The exchanges of civilized nations are effected in the form of sale, which is more convenient for all parties. But in actual practice, though the form of sale prevails, barter is not extinguished, but forms one of the commonest modes of trade. Thus a merchant in exporting a cargo of goods will probably with the proceeds import a cargo of some other goods, in order to make, if possible, a double profit on the transaction; and though one cargo has been sold and another bought for money no transfer of coin may take place in the transactions, the same agent being employed for both.

BARTFELD, a free imperial town in the county of Sáros, the most north-easterly county of Hungary. It is situated on the Tópl, not far from the frontiers of Galicia. The town is well built, and at one time enjoyed great reputation as a seat of learning. It has an exceedingly valuable collection of ancient records. Bartfeld carries on a brisk trade in wine, hemp, and linens. The population amounts to about 5000. In the vicinity are two chalybeate springs which are much resorted to, and the water from which is taken to other parts like those of Seltz.

BARTH, HEINRICH, an eminent German traveller, was born at Hamburg in 1821. After having been educated at the gymnasium of his native town he devoted himself to the study of philology and archaeology in the University of Berlin, and whilst yet a student travelled through Italy and Spain. In 1844 he took his degree at Berlin, and then went to England in order to acquire the English and Arabic languages. Some months after he entered upon his first African journey, in which he explored the whole range of the northern coast of this continent. On his way to Egypt he was plundered and severely wounded by a band of robbers. Fortunately, he had early in 1846 crossed from Tunis to Malta, and there deposited the greater part of his papers and collections. In the spring of 1848 he was again at Berlin, where he lectured on ancient geography, history of the Greek colonies, &c., and at the same time published his "Travels round the Mediterranean." The first volume of this work had scarcely appeared when Barth and his countryman, Dr. Overweg, by the interposition of Chevalier Bunsen, were allowed to join the exploring expedition which was being sent to Central Africa under the auspices of the British government. Barth followed the course of the Niger for several hundred miles, and for seven months resided at Timbuctoo. Richardson, whose narrative was published in 1853, and Dr. Overweg were removed by death; and after innumerable dangers and hardships Barth came home alone in September, 1855. The kings of Prussia and Wurtemberg decorated the indefatigable explorer, and public curiosity and sympathy followed him everywhere. The results of his researches were given in his "Travels and Discoveries in North and Central Africa," five vols. (London, 1856-58). He died in December, 1865.

BARTHOLOMEW FAIR. In former times this was the name of an important market, which was first held at West Smithfield, London, in 1133, and which was finally discontinued in 1855. The charter of this fair was granted in 1133 by Henry I. to Rahere, founder of St. Bartholomew's Priory and Hospital. The fair was held annually on the 24th August (O.S.), the festival day of St. Bartholomew, and soon after its foundation became celebrated for the miracle plays which were represented by the monks of the adjoining priory. These miracle plays were followed

in course of time by the representations called "Mysteries," and these in their turn by "Moralities." The representation of secular stories followed, and became indeed the origin of the British drama. During the fourteenth and fifteenth centuries it was one of the most flourishing fairs in England. Cattle, leather, and pewter were sold there, but the principal trade was in cloth stuffs, the clothiers and drapers having their stalls during the fair in the priory churchyard. In the priory the scholars of the different London schools met for public disputations and contests in verse; and a pedlars' court, or court of "Pie Poudre," was presided over by the prior within the priory wall, during the fair, to adjust disputed debts and contracts. In addition to the attractions of business the fair was famous for the sports and festivities which were held while it lasted. Ultimately it became a rendezvous for all manner of shows, exhibitions, mountebanks, acrobats, stilt-walkers, wrestlers, &c., and a favourite place for theatrical representations. The priory was suppressed by Henry VIII., and the building was purchased for a town house by Sir Richard Rich, afterwards lord chancellor; and the hospital, together with the charter, was transferred to the city of London in 1546. From this period the business of the fair began to decline; and towards the end of the sixteenth century a street of houses was built on the site of Cloth Fair, the name being retained until the present day. In 1593, the year of the great plague, the fair for the first time since its commencement was suspended, and it was postponed for various reasons in 1603, 1620, 1630, 1665, and 1666. At first the duration of the fair was three days; but it was gradually extended, and after the restoration of Charles II. it lasted for a fortnight or even longer. In 1691 it was limited to three days, in addition to the proclamation day, and this regulation was again enforced in 1700. In 1701 it was represented as a nuisance, and it gradually lost its position as a place of trade, until it acquired its modern notoriety as a mere place of riotous amusement and dissipation. The question of its abolition was discussed as early as 1798, but it was not until 1839 that measures were taken for that purpose. It was removed in 1840 to Islington, the last proclamation of the lord mayor was made in 1850, and it was finally suppressed in 1855. See "Memoirs of Bartholomew Fair," by Henry Morley, 8vo (London, 1859, and new edition, 1874).

BARTHOLOMEW, ST. a small island in the West Indies belonging to France, 30 miles N. of St. Christopher's. It is of an oblong shape, its greatest length being from E. to W., and contains 25 square miles. The population is about 10,000, of whom two-thirds are blacks. It is abundantly fertile, producing sugar, tobacco, cotton, and indigo; but it has no springs nor fresh water of any sort, except such as is supplied by the rain. Being surrounded by rocks and shoals, it is difficult of access; but its harbour, Le Carenage, on the west side of the island, is safe and commodious. Contiguous to the harbour is the principal town, Gustavia. This island was settled by the French in 1648, and was ceded by them to the Swedes in 1784. It was the only colonial possession of Sweden, and was ceded again to France in 1877.

BARTHOLOMEW, ST. (Heb. "son of Talmai"), one of the twelve apostles, is generally supposed to be the same person as Nathanael. He was a native of Cana in Galilee, and was brought to Jesus with commendation of his character by Philip (John i. 45-50). He was accounted a witness of the resurrection (John xxi. 2) and ascension (Matt. xxviii. 16), and afterwards returned with the other apostles to Jerusalem (Acts i. 13); but nothing is certainly known of his succeeding life and work. According to one tradition he went on a mission to the Indians, while others place the scene of his labours in Armenia and Asia Minor. The generally received tradition of his death is that he was flayed alive, and then crucified

head downwards; and he is frequently represented as holding a knife, in allusion to the horrible circumstances of his martyrdom. His festival is observed by the Roman Church on the 24th August, and by the Greek Church on the 11th June. A spurious gospel, now lost, was current in the primitive church under his name, and was condemned with others, by Pope Gelasius. It is not now extant.

BARTHOLOMEW'S (ST.) HOSPITAL, Smithfield, London, was originally part of the Priory of St. Bartholomew, and was founded in 1123 by Rahere, the first prior (originally the minstrel of King Henry I.), who had founded the priory in 1102, during the great revivals. After the dissolution of the monasteries by Henry VIII. it was refounded, and in 1544 contained 100 beds, a physician, and three surgeons. William Harvey, the physiologist, was physician from 1609-13. A medical school was established in 1662, and the hospital was rebuilt by subscription in 1729. It has been enlarged since, and now contains over 600 beds and relieves over 70,000 persons annually. It possesses large revenues, and is famous for its excellent medical school.

BARTHOLOMEW (ST.), MASSACRE OF, is the name by which is known the inhuman slaughter of the Huguenots at Paris on St. Bartholomew's Day (24th August), 1572. The civil war, which had raged between the Roman Catholic and the Reformed parties for eight years, had been brought to a close by the peace of St. Germain-en-Laye, and the Reformed had obtained the free exercise of their religion. Catherine de Medici, the queen-mother, then expressed much friendliness with the Huguenots, and arranged a marriage between Henry of Navarre, one of their leaders and nearly related to the royal family, and her daughter Margaret, which took place on the 18th August, 1572. A great number of the Huguenot noblemen and their followers came to Paris to celebrate the wedding, and being thus placed off their guard they became easy victims to the treachery and ferocity of the Catholic party. On the 22nd of August a shot was fired from a window of the palace at Admiral Coligny, who was wounded, but King Charles IX. visited him, and swore to punish the perpetrators of the crime: the Huguenots therefore remained in Paris. The plans which the party of the Guises, leaders of the ultra-Catholics, had carefully laid for the massacre were now ripe for execution, and the same day the king was persuaded by his mother Catherine de Medici, his brother the Duke of Anjou, Tavaune, De Retz, and others, to consent to its execution. A council was held by Catherine the same night, and final instructions were given to the French and Swiss Guards, and to the authorities of the city. On the eve of St. Bartholomew's Day Admiral Coligny was murdered, and at midnight the bell of St. Germain l'Auxerrois, or as some say a bell in the tower of the Louvre, gave the signal for the slaughter to commence. All the leading Huguenots in the city were murdered, and the king himself fired from a window of the palace on the fugitives who passed it. The massacre was continued in Paris for several days, and was repeated at Meaux, Orleans, Lyons, and throughout the provinces generally. In the six weeks which followed enormous numbers of the Protestants were butchered. Some authorities estimate the number at 30,000, others at 50,000, while some reckon it as high as 70,000 persons. On the 26th the king publicly stated to the Parliament that the massacre had taken place by his orders. Philip II. of Spain warmly approved of what had taken place, and offered his assistance to complete the work, while the pope, Gregory XIII., went in solemn thanksgiving to the Church of St. Louis, where a grand Te Deum was performed. He also ordered a medal to be struck in commemoration of the event, and proclaimed a year of jubilee. Many of the Huguenots fled the country, others took refuge in the mountains, and some took shelter in La Rochelle, which

was besieged by the king's brother, the Duke of Anjou. As, however, the duke was at this moment elected King of Poland, an arrangement was made in July, 1573, by which an amnesty was granted to the Reformers.

The massacre is sometimes called simply the Bartholomew, from the day on which it commenced. The Germans expressively term it *Blutheckerzeit*, or "Blood Wedding."

BARTOLOZZI, FRANCES/CO, was born in Florence in 1730. He received his first instruction in drawing in the Florentine academy. Here his acquaintance commenced with Giovanni Cipriani, with whom his name became afterwards intimately associated by their joint productions in art. Bartolozzi commenced engraving under Joseph Wagner of Venice, and when the term of his engagement with that master had expired he married a Venetian lady, and went to Rome, whither he had been invited by Cardinal Bottari. Here he established his reputation by his fine plates from the life of St. Nicholas, and by a series of portraits for a new edition of Vasari. Having completed these works he returned to Venice, where he was engaged by Mr. Dalton, librarian to George III., to engrave a set of drawings by Guercino, which having accomplished, that gentleman invited him to England to continue engraving for him on a stipend of £300 per annum; this offer Bartolozzi accepted. He arrived in England at the age of thirty-seven, and remained till he was seventy-five. Some of the earliest performances by which Bartolozzi distinguished himself in England were designs for tickets for the select performances at the Opera House; and he evinced so much talent in these limited subjects, and obtained such popularity, as to excite the jealousy of the celebrated engraver Strange, who pronounced him incapable of executing anything else. This illiberal remark brought on its own refutation. Bartolozzi immediately commenced his engraving of "Clytie," after Annibale Carracci, and that of the "Virgin and Child," after Carlo Dolce. These plates are well known; they are in the highest degree brilliant and spirited. Bartolozzi engraved a prodigious number of the paintings and drawings of Cipriani, who had likewise settled in England; the styles of the painter and engraver harmonize admirably; grace, elegance, and suavity are the characteristics of each, and their works for a considerable time held almost unrivalled possession of the public favour.

In the year 1802 Bartolozzi received an invitation from the Prince Regent of Portugal to settle at Lisbon, as superintendent of a school of engravers. He left England in his seventy-fifth year, and was received at Lisbon with all the respect due to his distinguished talents. He died in that capital in his eighty-eighth year, in poor circumstances. A sumptuous edition of Bartolozzi's life and works, with every luxury of paper, type, and ink, was produced by Mr. Andrew Tuer, in two vols., in 1882. Many of the original plates were used for the impressions; and the stippled work so characteristic of the time is faithfully rendered. The plates are printed in the red or brown ink so much affected by this engraver.

BARTON, ELIZABETH, popularly called the "holy maid of Kent," was engaged in 1525 as servant at an inn at Aldington in Kent. She was subject to epileptic fits, and in the paroxysms of her disorder vented her feelings in incoherent phrases and exclamations, which Richard Master, parson of the parish, took advantage of to make people believe that she was an instrument of divine revelation. She soon after entered the convent of St. Sepulchre's at Canterbury, and became a nun. In this new situation her ecstasies and revelations were multiplied, and she became generally known by the appellation of the "holy maid of Kent."

Had this poor creature confined her prophecies to the common occurrences of life, or even to the current topics of religious controversy, it is more than probable that she would have been permitted to die in peace; but, led by

her zeal, or more probably worked upon by others, she boldly denounced the divorce then in progress of Queen Catherine, and prophesied the death of the king. The government at length proceeded to take active measures against her and her adherents. Accordingly, in November, 1533, the nun, with five priests and three lay gentlemen, her accomplices, were brought before the Star Chamber, and sentenced to do public penance as impostors at St. Paul's Cross. From the pillory she and her companions were lead back to prison, where they lay till the following January, when they were attainted of high treason. On the 21st April, 1534, the nun was beheaded at Tyburn, together with the five priests.

There are some small discrepancies in the accounts of this woman's confession and of the execution of herself and her accomplices. The credit and countenance which Fisher, bishop of Rochester, and Sir Thomas More had given to her were among the articles of accusation against these two persons.

BARTON SERIES, in geology, consists of sands and clays lying beneath the Heaton and above the Bracklesham Beds. Lyell classes them as the lowest member of the Upper Eocene. They are named from their occurrence in Barton Cliff, Hampshire, where the clay is 300 feet thick; the same thickness occurs in Alum Bay. From Alum Bay it may be traced across the island to Whitecliff Bay. It is used for making bricks at Grenville, north of Christbrook. The pathway from the chine to the beach at Alum Bay cuts through the Barton clay. The sands in the upper part have been used for glass-making; these sands are placed by the geological survey in the Upper Bagshot, while the clay is called Middle Bagshot. The clay is full of septaria, and rich in fossils, the whole of which are of marine origin. The most characteristic shells are *Chama squamosa*, *Crassatella sulcata*, *Voluta ambigua*, and *Typhis pungenis*.

BARTON-UPON-HUMBER, a market-town in Lincolnshire, on the south side of the Humber, 176 miles from London, and 6 miles S.W. from Hull. It is an ancient town, and at the time of the Norman conquest was one of the principal ports of the Humber. It contains two large churches, one of which is very ancient, and places of worship for dissenters. A thriving trade in corn is carried on; and bricks, tiles, ropes, and sackings are manufactured. The population in 1881 was 5339.

BAR WOOD, a red dye-wood brought from Africa. The tree which produces bar-wood is called by botanists *Baphia nitida*. The flowers are much like those of the laburnum, and both trees belong to the same order, the LEGUMINOSÆ. The dark red seen upon British bandana handkerchiefs is produced chiefly by the colouring matter of bar-wood, soddened by sulphate of iron. It is also used by dyers for the same purposes as Brazil-wood. The wood is collected in the country between Angola and Sierra Leone.

BARYTES or **HEAVY SPAR** is a mineral, the sulphate of baryta, consisting of baryta 66, and sulphuric acid 34. It is found in mineral veins, and in various rocks, both stratified and igneous. This mineral is of a foliated structure, and often of a white or flesh colour. Its specific gravity is 4.5, and hardness about 3. It is used to mix with white lead, rendering the lead pigment more permanent. Upwards of 10,000 tons are employed in this way annually. The green fire of pyrotechnists is a mixture of this mineral with other substances.

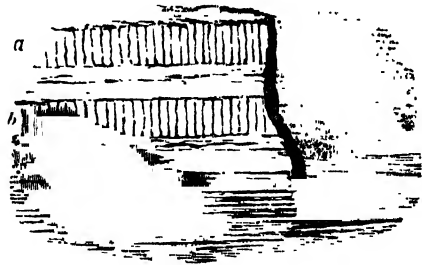
BAR'YTONE or **VIO'LA DI BARDONE**, an instrument which Leopold Mozart considered one of the loveliest of all, and which Haydn so admired that he studied it practically for some time, was one of those instruments depending for part of their effect on the sympathetic resonance of secondary strings, which have now all gone out of date. The baryton was in use up to the end of the eighteenth century, and Haydn wrote 175 pieces for it. It was held like the

violoncello and was about that size, but its tone was weak and delicate. The bowed strings were of catgut, and were six or seven in number, stopped by the fingers and bowed as in the violoncello. They were stretched above a very lofty finger-board, beneath which passed a great many metal strings, varying in number from about twenty upwards—some instruments having as few as nine only; these metal strings were probably tuned in consecutive notes. Their office was to resound by sympathy, when a note harmonic to them was produced from the bowed catgut strings above the finger-board; and also occasionally they might themselves be plucked for the production of pizzicato effects.

BAS'YTONE. See **BARITONE**.

BAS or **BATZ**, an island off the north coast of the department of Finistère in France. It lies N.N.W. of the town of Roscoff, is about 3 miles long and 2 broad, and is distant from the mainland about three-quarters of a mile. A lighthouse, with a revolving light of the first class, eclipsed every alternate minute, is erected on a hill 223 feet above the sea-level. The island contains three villages.

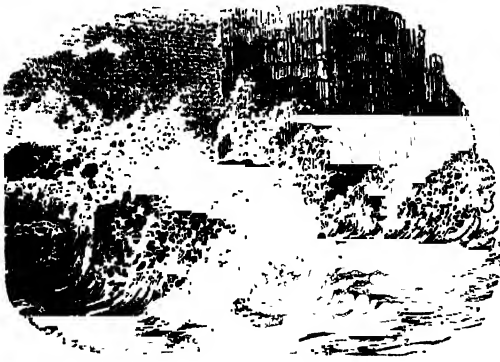
BASALT' is a hard dark-coloured rock of igneous origin. The crystalline volcanic rocks, or lavas, are classed either as trachytes or basalts. Basalts differ from trachytes in being heavier, in having less silica (from 45 to 55 per cent.), and a large proportion of earthy bases, such as potash, lime, oxide of iron. They are composed of trichlinic felspar, usually labradorite, and augite, together with certain adventitious minerals, as magnetic iron and olivine. Basalt is a rock of very extensive occurrence on the surface of the earth. The greatest mass yet observed is that noticed by Colonel Sykes in the Deccan, constituting the surface of many thousand square miles of that part of India. When basalt occurs in horizontal tabular masses, and is columnar, the columns are generally perpendicular, as at *a* and *b* in the



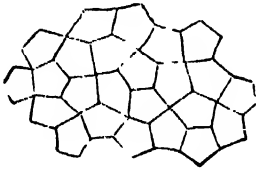
annexed figure. The peculiar character of the scenery at Staffa and the Giant's Causeway depends upon this columnar structure. The columns are six sided, and are jointed at intervals with a kind of ball-and-socket arrangement: each prism between two joints is convex at one end and concave at the other. The columnar structure has been artificially produced by Mr. Gregory Watt, who melted 7 cwt. of basalt, and then kept it in the furnace for several days after the fire was reduced. When basalt forms the substance of a perpendicular dyke, cutting through other rocks, and is columnar, the columns are usually horizontal. Basaltic columns are sometimes also curved, and of this mode of occurrence there is a beautiful example in the island of Staffa. The reason is that the columns are perpendicular to the surfaces upon which the molten rock cools.

When basaltic columns are jointed, and exposed to the destructive action of breakers on a coast, they often, as in the following sketch, present the appearance of some great ruined work of art. Such deceptive appearances are, however, not confined to the coasts, for in some countries, and especially in India, masses of basalt rise suddenly from the plains, and the broken columns, shooting upwards, may readily at a distance be mistaken for buildings. When

viewed from above, the heads of a number of basaltic columns, if unbroken, appear like a pavement composed of



numerous polygonal pieces of stone fitted into each other, as in the following figure:—



This characteristic is represented on the Plate, Columnar Basalt, Fingul's Cave, Staffa, prefixed to this volume.

Some non-columnar basalts present no trace of any particular arrangement of parts, while others show a globular structure, so that when the rock becomes much decomposed it has the appearance of numerous bomb-shells and cannon-balls cemented together by a ferruginous substance. This globular structure is sometimes also apparent when the decomposition of the rock has not been considerable, being well exhibited in the concentric arrangement of coats of basalt round centres at variable distances from



each other, in the manner here represented. This structure, according to Delesse, is due both to crystallization and contraction.

Basalt is melted down and used for decorative and ornamental purposes, and also for tiles for pavements. When rendered sufficiently fluid in a reverberatory furnace, it is poured into moulds of sand encased in red-hot iron boxes. The basalt in this way cools slowly, forming a stony substance; whereas rapid cooling would produce a brittle glass, like obsidian. See DYKE, GIANT'S CAUSEWAY, STAFFA.

BASE, in architecture, the foot or lower portion of a column on which the shaft rests. The Grecian Doric order is the only one of the classic orders which has no base. The height of the base varies considerably, but is usually about half the diameter of the lower part of the shaft. It is divided into the plinth, the name given to the flat square portion immediately above the ground, and the mouldings, which are generally circular. The most usual base is the "attic base," which is at the same time the simplest and the most beautiful. It consists of two *tori* (the torus being a

moulding of nearly semicircular outline), separated by a *cavetto* or hollow moulding, the outline of which is formed by a curve composed of two quarter circles with different radii. The upper torus in the attic base is but little larger than the column itself, and is very often ornamented with a guilloche or other pattern; then comes the cavetto, sweeping in under the torus in a quick turn, and then as it gets into the flatter curve with its longer radius sweeping outwards without a break to the much wider lower torus. This, with the cavetto, is generally left plain.

The bases of piers and of columns in Romanesque architecture are often fantastic to exaggeration, but the main outline of the attic base may be traced oftentimes by the careful observer through all the leaves, animals, and ribbons of stone which enrich them. In Gothic architecture bases of piers generally take the main outline of a square, placed diagonally and rounded off at the corners, on which rests the base of each small shaft (those shafts which cling to the central pier in the manner known to and loved by all admirers of the style) by its termination, a small torus; but in details Gothic bases become too complicated and too diverse to bring under any rule. The tori of the shafts are made to stand upon square pillars very frequently, and these pillars melt away into the final form of the base by moulding after moulding.

BASE, in music. See **BASS**.

BASE BALL, a game which holds somewhat the same position in the United States of America as cricket does in Great Britain. It is founded on the old British game of rounders, though many additions and alterations have been made. Americans scarcely understand the patience of Englishmen, and do not care to witness a cricket match which may extend over three days and then remain undecided, whereas the average time of a base-ball match is from two hours to two hours and a half. In 1874 two American base-ball clubs crossed the Atlantic and played a series of exhibition matches in England and Ireland, but the pastime, though originating here as rounders, has not, in its modified form, taken root in British soil.

BASE LINE. The measurement of a line from which, as a base, the triangulation or survey of an entire country may be calculated, is a most delicate operation. Let A B



be such a base line. Then if it is measured in miles we can put it proportionately on paper in inches. Now at B observe and measure the angle $A B C$ (C being a distant church steeple, for instance), and draw on the paper the angle $A B C$ with exactly the same opening or degree of divergence [see **ANGLE**]; do the same at the point A , so that the angle $B A C$ is exactly equal on the paper to the real angle observed from the base line. On the paper the sides $A C$ and $B C$ will meet in C , and can be measured in inches; and since the triangle so drawn is a complete copy, on a scale of an inch to a mile, of the triangle which exists in nature, and is proportionally correct in all its parts, the side $B C$ represents in inches the true distance $B C$ in miles. We therefore take $B C$ as our new base, and find the distance of a far-off tower at D , and so we go on till the whole country lies mapped upon the paper an inch to a mile. 'It is manifest that the observing stations must be lofty, as hill tops, steeples, towers, &c., so that from any one may be clearly seen the two others making up its "triangle," in order that their "bearings" or angle with the base at that time being used may be clearly measured.

It is evident therefore that the whole survey rests upon the accuracy of the original base line. Base lines have

been measured in many spots of level ground in England, as Houslow Heath, Romney Marsh, Misterton Carr, Salisbury Plain, &c., but the principal base line, that on which the famous "Ordnance Survey" rests, is in Ireland, traced along the sands of the east side of Lough Foyle, near Londonderry. It was measured with the most consummate care by means of bars of metal, the length of which, at a given temperature, was exactly known, and which was at the time of observation corrected for expansion or contraction due to variations of temperature. The bars were not placed close together, for fear lest their expansion by heat might shift them from their places (a precaution observed on every railway line, as the reader may himself perceive), and the intervals between the bars were measured by microscopes. By means of these and other precautions (as of bars of compensating metals, &c.), the possibility of error in a line of 8 or 10 miles length was reduced to a very small fraction of an inch; and as the line has been repeatedly measured it is believed there is *absolutely* no error. But a better proof of accuracy exists in the fact that after all the many triangulations taken in order to reach from Lough Foyle to Salisbury Plain, with all the possibilities of error in each observation added to the possibility of error in the base line itself, it was found that the side of the triangle on Salisbury Plain, as predicted from the maps of the surveyors, corresponded within the merest trifle with the actual line on the ground, which was carefully measured for this purpose.

It is by means of accurate surveys of this kind that the size of the entire globe itself is determined. For, without going into details, it is self-evident that if a star be observed from a place *x* as being exactly in the zenith, and it be also observed at the same moment at the place *y* to be one degree *below* the zenith (*x* and *y* being on the same meridian of longitude), then *x* and *y* are one degree apart on the earth's surface. If, therefore, the distance between *x* and *y* be known, having been ascertained in the manner described, to be 364,951 feet in our latitude (52°), this gives us the measure of a degree, or the 360th part of the entire surface. The earth not being quite regular in form other considerations must come in, and these will be dealt with in the article *FIGURE OF THE EARTH*; meanwhile it is sufficiently remarkable to notice, as observed pithily by Professor Airy (the late astronomer-royal), that we actually do "measure the distance of the sun, and the moon, and the stars, from the earth by a yard measure," since all these depend upon the true measurement of our base line.

BASE OF OPERATIONS is the name given in warfare to some spot or line on which the general of an army can rely as a magazine for the supply of food, forage, and ammunition, to which his sick and wounded can be sent, through which he can receive fresh supplies of troops, and to which he can retreat when defeated. This may be a port, or stretch of sea-coast, or river, or mountain range, according to circumstances, but it must comply with all the conditions enumerated, or it cannot be regarded as being sufficient for the purpose. Thus the base of operations in the short and brilliant campaign in Egypt in the autumn of 1882 was the Suez Canal.

BASEDOW, JOHANN BERNHARD, a celebrated German educational reformer and author, was born at Hamburg on the 2nd September, 1723, being the son of a wigmaker. He attended first the Johanneum in his native town. After having run away from the barber's, and engaged himself as servant in Holstein, and having proved himself to be capable of something higher than wigmaking, he was sent by friends to the University of Leipzig. In 1749 he left the university, unable conscientiously to take orders, and became a private tutor. In 1753 he was appointed to a mastership in the academy of Soroe in Zealand, through the influence of Herr von

Quaalen, whose children he had taught, but in consequence of his unorthodox opinions was removed to Altona in 1761. The study of Rousseau's "Emile," in 1762, caused him to resolve upon realizing Rousseau's educational ideas, and the bringing about of a reform of the prevailing methods of education in Germany. In 1774 he published his "Elementarbuch" in three languages, illustrated with 100 copperplates by Chodowiecki. By these illustrations the senses of the children were to be awakened, and by being made acquainted with foreign languages, scenes, customs, dresses, &c., they were to be made practical people and true citizens of the world.

He had succeeded in interesting the Danish minister, Bernsdorf, in his educational theories and writings, and he had been allowed to retain his salary from the Altona Gymnasium while he travelled about to get subscribers to his work. He was most successful, and in the preface he acknowledges contributions from the Emperor Joseph II., from Catherine II. of Russia, from Christian VII. of Denmark, and from many celebrities and institutions, amounting in all to over £2000. With this aid he produced his book. In Goethe's "Wahrheit und Dichtung" there are most amusing sketches of Basedow during these years of travel, to which we must refer the reader. One characteristic passage may be here quoted. It occurs at Ems, where Goethe was visiting people of the highest fashion, "in return for which dissipations," says he, "I always passed a part of the night with Basedow. He never went to bed, but dictated without cessation. Occasionally he cast himself on the couch and slumbered, while his amanuensis sat quietly, pen in hand, ready to continue his work when the half-awakened author should once more give free course to his thoughts. All this took place in a close confined chamber, filled with the fumes of bad tobacco and the odious funder which he always used. When, after a talk, I hurried again to the ball-room, before I had closed the door behind me he would resume the thread of his essay as composedly as if he had been engaged with nothing else."

It was through a friend of Goethe's, Behrlich, that Basedow became acquainted with Prince Leopold of Dessau, at whose invitation he went to Dessau, and there opened a model school, called the Philanthropium, in 1774. Assisted by some excellent teachers Basedow soon attracted general attention; but the institution, always very small as to numbers, prospered only for a short period—the restlessness of its founder, and his unruly and quarrelsome temper, being one of the chief causes of its speedy decay. He left it in 1778, but still continued to labour for the cause of education, and published several works on the subject. He died at Magdeburg, 25th July, 1790. The school, still conducted on his principles, rose to great popularity after he had left it. Basedow attracted great notice during his lifetime in Germany, and many of his ideas have been permanently adopted in the education of the young; but, on the other hand, Basedow, like all innovators, cannot be entirely freed from the reproach of narrowness, exaggeration, and a want of respect for the ancients. His own limited and defective scholarship was a serious hindrance to the effectiveness of his plans.

An amusing sketch of the Dessau School may be found in a pamphlet by Herr Schummel of Magdeburg, entitled "Fred's Journey to Dessau." Fred being supposed to be a boy of twelve years old. Fred is much surprised, in that age of pomatum and powder, laced coats and knee-breeches, to find the pupils with "hair cut short and innocent of the perruquier, their throats quite open, and their shirt collar falling over their coat." This outward freedom was a symbol of Basedow's whole system. Fred describes the children playing games in *Latin*, as their Latin lesson, and shouting with boyish eagerness when the teacher drew a sort of griffin with a beak, and called it *leo*,

"Non est leo! leones non habent rostrum;" or guessing *caput, nasus, os, manus, pes*, in the endeavour to find out what part of the body the teacher had thought of. Then they acted a little play in German and another in French. The inherent love of children for motion and noise was thus turned to good account—a principle of education destined, however, to yield a hundredfold more under the hands of **BESTALOZZI**, and a thousandfold after passing through the creative brain of **FROENEL**. Basedow's division of time is very characteristic and excellent; he allows eight hours for sleep, eight for food and amusement, six for school work, and two for training in some handicraft. For children of the poor the last two are reversed, and six hours are spent in learning a trade against two hours for pure school work.

BASEL, BASLE, or BALE, the most north-western of the Swiss cantons, is bounded E. by Aargau, S. and S.W. by Solothurn, W. by Bern and Alsace, N. and N.E. by Baden and the Rhine. It extends about 23 miles from N.W. to S.E., and has an average breadth of about 9 miles. Its form is very irregular. The area is 180 square miles, and the population in 1880 was 124,372. The greater part of the canton lies upon or between objects of the Jura Mountains, the principal ridge of which divides the southern part from Solothurn. The northern part slopes towards the banks of the Rhine, and forms a plain round the town of Basel. This part of the territory is very fertile in corn and wine; the rest abounds in rich pastures, which feed large numbers of cattle and sheep. The Rhine supplies good fish in abundance. The other river of the canton is the Birs, which rises in the Münster Thal, in the canton of Bern, enters Basel at Aesch, and joins the Rhine about half a mile east of the town of Basel. It is subject to sudden floods.

The canton of Basel is divided into seven districts, two of which are north of the Rhine, and the others south of that river. In 1833, in consequence of internal disputes which caused the Diet to interfere, the town of Basel, with the two districts north of the Rhine, and a narrow strip of ground to the south adjoining its walls, was formed into a separate republic called *Basel Town*; the rest of the canton, composed of the other five districts, forms another republic called *Basel Country*, with Liestal, a town of about 4000 inhabitants, for its capital. Each of these two states sends a deputy to the Diet; but the two have only one vote between them, and if they do not agree the vote is null. About three-fourths of the people are Protestants. The language is a dialect of German, but French is generally understood.

The country which forms the canton of Basel belonged, in the times of the Romans, to the territory of the *Rauraci*. In the middle ages it formed part of the Burgundian empire till 1026, when it came into the possession of the German emperor Conrad II. Basel was subsequently governed by an imperial bailiff, but the Bishop of Basel shared with the citizens in the government. By degrees the city acquired the same immunities as a free city of the empire. Basel assisted the Swiss in the Burgundian war, and was admitted a member of the confederacy in 1501.

BASEL, BASLE, or BALE, formerly the capital of the canton of Basel, now of the republic of Basel Town, in Switzerland, is next to Geneva the largest town in Switzerland. It stands on the Rhine, which divides it into two parts, Great Basel on the left bank, and Little Basel on the right. The two divisions are connected by three bridges, the oldest having been originally erected in 1229. Some of the streets of Great Basel are confined and crooked; in the suburbs and Little Basel they are broad and regular. There are many public fountains in the town, several of which are adorned with sculpture. The cathedral, which stands in an elevated position, is a remarkable structure. Its two steeples are each 205 feet high. It is built on

the spot where the Roman emperor Valentinian originally erected the strong fortress called *Basilia* (from which the town derived its name), and contains the tombs of *Cœolampadius*, *Erasmus*, and the Empress Anne, consort of *Rodolph of Hapsburg*. Adjoining the cathedral is the great hall in which the Council of Basel held its sittings from 1431 to 1443. The town-house contains two large and finely ornamented halls. The *Pfalz*, near the cathedral, which is a terrace raised on a wall 75 feet above the Rhine, and planted with chestnut-trees, commands a beautiful prospect of the river, the town, and the country. Foremost amongst the modern buildings of Basel is the Gothic church of St. Elizabeth erected in 1858, and embellished with fine stained glass from Munich. Besides a university, Basel contains several religious, literary, and scientific societies, schools, and public and private libraries; the university library is very valuable. The museum contains a collection of paintings, drawings, and woodcuts by Holbein. There are several charitable institutions. Basel is a prosperous commercial city, and is indebted for its wealth to its convenient situation for traffic with France and Germany, and to the enterprising character of its inhabitants. The chief manufacture of the town and of the canton is silk ribbons. There are likewise large tanneries, tobacco manufactories, &c. Basel has excellent railway accommodation, being connected with Strasburg, Paris, and Brussels on the one hand, and with Bern, Lucerne, and Zurich on the other. The population in 1880 was 60,500.

An important treaty of peace was concluded at Basel in 1796 between France, Prussia, and Spain. Prussia withdrew from the coalition against France, and also gave up her possessions beyond the Rhine, whilst Spain gave up her portion of St. Domingo, and prepared the way for a future alliance with France.

In the vicinity of Basel a marble monument has been erected to commemorate the battle of St. Jacob's, in 1444, when 1600 Swiss kept a French army, twenty times their number, in check for ten hours, being at last all killed with the exception of ten.

BASEL, THE COUNCIL OF, an important ecclesiastical council held in the city of Basel between 1431 and 1443. It was summoned by Pope Martin V. in accordance with the command of the Council of Constance, which had sought to insure the regular convocation of periodical councils superior to pope and clergy alike. On his death at the commencement of the proceedings his successor, *Eugenius IV.*, sanctioned the decree by which the council had been convened; and at the meeting of the council on 23rd July, 1431, the new pope was represented by the cardinal legate *Julian Cesarini* of St. Angelo, who presided over it. The special objects for which it had been called were the reconciliation of the Hussites of Bohemia with the Roman Catholic Church, the reunion of the Eastern and Western Churches, and the reform of abuses in the church itself. Very careful arrangements were made for the transaction of the business of the council; but the efforts made towards the conciliation of the Hussites, and the manifestation of a disposition on the part of the assembled bishops towards the limitation of the power and influence of the Papacy, still stronger than that shown at Constance, alarmed the court of Rome, and the pope endeavoured to dissolve it in April, 1432. The council, however, offered a stout resistance, denied the right of the pope to dissolve it, and declared that the authority of a council was superior to that of the pope. The efforts of *Eugenius* to remove the council to Italy were equally unsuccessful. The contest continued; the council first summoned the pope and all the cardinals to appear before it, pronounced them contumacious on their refusal, and finally suspended the pope from office, and assumed his functions, ruling Avignon, &c., and arrogating all ecclesiastical decisions to themselves. Their authority was accepted in France and Germany, and by the Prague Compact

of the 20th November, 1433, peace was made with the most powerful section of the Hussites, the Calixtines, who were granted the use of the cup for the laity in the Lord's Supper. This act enabled the Emperor Sigismund to gain possession of Bohemia, and he then intervened as a mediator between the council and the pope. The latter being troubled by insurrections at home, and alarmed at his loss of power in France and Germany, recalled his dissolution and confirmed the acts of the council by his bull "Dudum Sacrum," issued 15th December, 1433. The truce, however, was but of short duration. The members of the council were bent on limiting the power of the Papacy, and to this end they abolished the ANNATES, and the presents of money sent by the bishops on their investiture, restored the right of free election to the chapters of cathedral and collegiate churches, and passed several important measures for curbing vice and immorality in the clergy, and affecting the internal administration at Rome. Terribly exasperated and alarmed the pope renewed his conflict with the council, and determined either to remove it to Italy, where he could dominate its proceedings, or else to dissolve it. The question of the reunion of the Greek and Latin churches furnished the occasion, and by skilful management he contrived to bring the Eastern patriarch and the delegates of the church, together with the emperor himself, John Palæologus, to Ferrara, to which place the council was summoned. The members, however, refused to sacrifice their liberty in this manner, and sent their own ships to fetch the Greeks to Basel; but the vessels of the pope outailed them. Issue was finally fully found when, in 1438, the pope called an opposition council at Ferrara, declaring all subsequent proceedings at Basel worthless, and the Council of Basel, on the other hand, decreed the suspension of the pope and his formal deposition on the grounds of simony and perjury, electing Amadeus VIII., duke of Savoy, a weak-minded hermit, to be pope under the title of Felix V. It is curious to note that the deposition of the pope at Basel, and his triumphant public reconciliation of the Greek and Latin churches at Florence, occurred within a day of each other (25th June, 1438). The cardinal legate Julian and nearly all the Italians went over to the side of the pope, and though the leadership of the council was conferred upon a man of great ability and determined courage, Cardinal Louis Allemand, archbishop of Arles, the Papal party gradually gained the ascendancy until in 1449, two years after the death of Eugenius, the few remaining members of the council who had stood firm were glad to obtain an amnesty from the new pope, Nicholas V., Felix resigning the office conferred upon him, and the members ratifying his abdication. The decrees of the council are not accepted by the canonists of the Church of Rome, but the earlier decrees were accepted in France and Germany, where they were included in pragmatic sanctions. Their necessary connection with the decrees of the Council of Constance were defended by Bossuet in his "Defence of the Gallican Declaration of 1682." The part taken by Æneas Sylvius Piccolomini in this council, even extending to the crime of forgery on one occasion, is certainly despicable; yet he afterwards came to the tiara himself as Pope Pius II.

BASEMENT, in architecture, is the lowest story of a building, forming the base of a private house or public edifice. This feature of a building should possess externally the character of strength; and, accordingly, in the designs of Palladio and the other great masters of the Italian "classical" Renaissance school, we find that the basement has a massive appearance, capable of sustaining the order or orders which are often placed above it. In edifices used as dwellings the basement is high, but in churches and other public buildings it is usually kept low. Some basements are as high in proportion as the floor or story placed above them, while others are not more than a third or half of the height. The proportions of basements

vary according to the conveniences required in the lower story, or to the importance attached to the floor or floors which they may support. In basements the masonry is usually rusticated and set upon a plinth, on which there is sometimes a moulded base; the upper part of the basement is surmounted by a broad band, under which, at times, mouldings are employed. A cornice is also used occasionally instead of the band.

In the beautiful palaces of Rome and Florence the basements are finely proportioned. The designs of Palladio, Vignola, and Scamozzi may also be consulted with very considerable advantage by those who desire further acquaintance with this very characteristic feature of the "classical" style of the Renaissance.

BA'SHAN is called by the Septuagint *Basan*, by Josephus and Ptolemy *Batanaia* (Batanae). It belonged to Gilead in the widest sense, but in a stricter sense it was distinguished from and situated to the north of Gilead. Bashan bordered in the north upon the Syrian districts Geshuri and Maachathi; in the south it did not reach to the river Jabbok. Its western boundary was the Jordan, and its eastern the Syrian plateau. It was famous for its pastures.

Bashan was a kingdom under Amoritical sovereigns, who resided in Ashtanof and in Edrei. Og was the last king of the Amoritical dynasty. In the battle of Edrei, about the year 1452 B.C., the Israelites smote Og, with his sons and all his people, until there was none left alive; and they possessed his land. Moses gave Bashan unto the half tribe of Manasseh, B.C. 1451. At the commencement of the Christian era Bashan belonged to the tetrarchy of Philippos, and afterwards to the tetrarchy of Agrippa II.

BASHEE' ISLANDS, a cluster of five islands and four rocky islets, lying between the islands of Luzon and Formosa. The five islands, which are inhabited, were named by Dampier, who discovered them in 1687, and named one of them after *bashi*, an intoxicating drink used by the natives. The other four he called Orange, Great, Monmouth, and Grafton Islands. The inhabitants are a strong athletic race, very inoffensive in their manners. The Spaniards took possession of these islands in 1783. The governor resides on Grafton Island, on the western side of which is a good anchoring ground. The islands are plentifully supplied with water, and produce sugar-canes, plantains, yams, and other vegetables. The population is about 8000.

BASHI-BAZOUKS', the name given to corps of irregular Turkish troops in the pay of the Sultan, and drawn chiefly from Asia. Wild, undisciplined, and turbulent, they are only available as light cavalry, and are quite unequal to meeting regular troops in open warfare. In the Russo-Turkish war large numbers of them were employed by the Turkish government, and they proved themselves to be thorough scoundrels, plundering friends as well as foes, and guilty of the most horrible barbarities towards the peasantry and the Russian wounded and prisoners. Their fighting power was very slight, and though they had been well armed by the Turkish Government they were frequently defeated by much smaller numbers of the Russian regulars.

BASID'IA are structures found in FUNGI. Each consists of one cell, and bears one or more spores (reproductive bodies). The spores borne in this way upon Basidia are called basidio-spores.

BASIL. Sweet or Common Basil is *Ocimum basilicum*, a plant belonging to the LABIATÆ. This aromatic herb was known both to the Greeks and Romans. It is a native of India, an annual, growing about a foot high. The leaves have a flavour of cloves, and are used for seasoning. The Bush or Lesser Basil is *Ocimum minimum*, used for the same purpose as the sweet basil, and much like it, though smaller. These plants should be cut while the flowers are still in bud, and dried in a warm shady place. The Indian

Holy Basil (*Ocimum sanctum*) is grown round Hindu temples. It is considered sacred to Vishnu and Krishna. Beads are made from the root, and worn as necklaces and bracelets. Wild Basil (*Calamintha Clinopodium*) and Basil Thyme (*Calamintha Acanthos*) belong to the same order. These plants also are aromatic, and were prized by the old herbalists. Gerard, in speaking of basil thyme, says that "the seeds cureth the infirmities of the hart, taketh away sorrowfulness which cometh of melancholic, and maketh a man merrie and glad."

BASIL, ST., or **BASIL/IUS** (Gr. *Basileios*), on account of his learning and piety surnamed *the Great*, was born at Caesarea in Cappadocia, about the year 326. In his earlier years he received instruction from his father, but went afterwards and studied at Antioch, Constantinople, and Athens, where he formed a close intimacy with Gregory of Nazianzen. He returned to his native country about the year 355, and taught rhetoric. Some time after this he travelled into Syria, Egypt, and Libya to visit the monasteries of those countries, where he found the lives of the monks so exemplary that he resolved upon his return home to follow their example, and accordingly he instituted an order of monastic life in the province of Pontus. Upon the death of Eusebius, in the year 370, he was chosen his successor in the bishopric of Caesarea. It was with some reluctance that he accepted this dignity, but no sooner was he raised to it than the Emperor Valens began to persecute him because he refused to embrace the doctrine of the Arians, of which, indeed, he and Gregory Nazianzen were strenuous opponents. The emperor ceased, however, at length to molest Basil, who continued to take a part in most of the controversies of the age. He died 1st January, 379, his constitution being much impaired by the austerities of a monastic life. His anniversary is celebrated by the Church of Rome on the 14th June, but by the Greek Church on 1st January.

A complete edition of Basil, in Greek, was issued from the press of Frobenius (folio, Basel, 1532), with a preface by Erasmus.

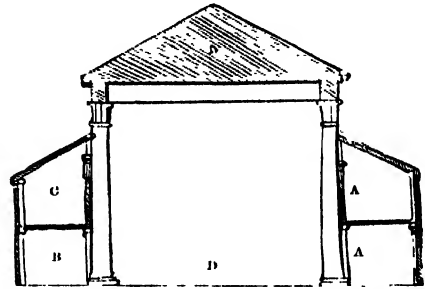
(Cave's "History of the Fathers of the Church," folio; Suidas, "Basileios of Caesarea.")

BASIL, MONKS OF ST. When St. Basil, bishop of Caesarea, retired into Pontus, about the year 358, for the convenience of himself and his followers he founded a monastery, to which he gave a written rule for its regulation, the first of the kind that had appeared, and which was soon adopted in numerous other monasteries. This rule shortly spread itself over the East, and according to the generality of writers was not very long in passing to the West. Those who adopted it styled themselves of the order of St. Basil; and St Basil's rule was, in fact the parent of that which was afterwards framed by St. Benedict. St. Saviour, at Messina, is now considered as its chief monastery in the West. The monks of St. Basil in Spain follow the Greek ritual, those of Italy the Latin. The Greek monks are chiefly of this order, which exists to a great extent in Russia. The order of St. Basil was never introduced into England.

BASILICA (from the Greek *Basilikē*) literally signifies a royal edifice, and was applied to a public court where princes and magistrates administered justice; but we have no account of any royal residence being specially called by that name. The name was probably derived from the King Archon (*Basileus*) of Athens, whose court was called the King's Portico (*Stoa Basilikē*). The Romans gave the name of Basilica to those public buildings with spacious halls, at first unroofed like many modern exchanges, often surrounded with wide roofed porticoes, as many as twenty of which were built at different times in the various fora of Rome. [See FORUM.] They were usually called after the person who caused them to be built.

The principal feature of the basilica, as finally developed, was a large roofed nave, supported on columns, the length

of which was not usually less than twice its width. The roof, which was called the *testudo*, rose high above the other part of the structure, which consisted of one or more, generally of two, galleries, called *porticus*, placed one above the other along the internal sides of the central building. The porticus was covered with a lean-to roof, the upper part of which commenced below the capitals or the columns which supported the testudo. The light was admitted



D, D, Testudo; A, A, Parastatē; B, Lower Portico; C, Upper Portico.

between the spaces formed by the under line of the architrave of the testudo, the upper line of the lean-to roof, and the particular lines of the columns. In the loftiest basilicas there were two stories of columns, an arrangement still seen in some churches; these supported the roofs of the two side galleries or porticoes; the clerestory being a third range of openings higher still. At the end of the central part of the interior a raised platform formed the tribunal for a magistrate. The term *testudo*, as its name implies, is strictly the roof of the central part; but the term is also extended to signify the whole of the central space, which corresponds to what we call the nave of a church; the porticoes correspond to the side aisles.

The basilica was not only used as a hall for the administration of justice, but afforded also convenient shelter to the merchants, as well as a meeting place for business men generally. The size and proportions of these edifices varied according to circumstances.

It is probable that Rome possessed basilicas in all the different fora of the city. Of these the Basilica Ulpia, which formed a part of the Forum Trajanum, is the only one of which there are considerable remains left; it is represented on the reverse of a copper coin of Trajan. The ruins of another basilica, of the Corinthian order, exist on the Palatine Hill. A large edifice of this character in the Forum Romanum, begun by Maxentius, is usually named the Basilica of Constantine, as it was completed by the latter emperor.

The most perfect basilica of antiquity exists in Pompeii, constructed on the south-west, and consequently the warm side, of the Forum. This edifice is 220 feet by 80. The testudo rose to the height of about 60 feet, judging from the diameter of the portions of the columns still remaining.

The early Christian churches of Rome may be considered as the best resemblances of the Roman basilicas. In some of them are still found many of the characteristics of the ancient basilicas, and many are known to have been formerly actual Roman basilicas—such as S. Croce and S. M. Maggiore at Rome, once the basilicas attached to the Ses-



sorian and Liberian palaces respectively. There are twelve churches in Rome called basilicas, the oldest of which dates from about the time of Constantine, and is even said to have been built by that emperor. The first churches were looked upon as tribunals in which the bishops and others administered penance to the guilty, and the eucharist to the absolved. Nothing could appear at first sight more appropriate than the idea of converting a temple of law into one of religion, or of imitating a tribunal of justice in the construction of new churches, in which the bishops and priests were to administer a kind of spiritual justice. This remark is well supported by the fact of the bishop's throne being placed behind the altar in the apsis, or arched recess corresponding to the curved recess or hemicycle, as it was called, of the ancient basilica. It is, however, more probable that the obvious convenience of the basilica led the early Christians to adopt the principles of that form of building, as these edifices were both light and spacious, and better adapted to the ceremonies of the new religion than were the temples of the pagans.

The apsis was separated from the nave by a large arch (the "triumphal arch") not reaching up to the ceiling of the nave, and the flat wall-space between the crown of this large arch and the roof was the favourite position for large pictures in mosaic, many of which still exist of very early date; one of the finest in St. Paul's Without the Walls, Rome, being of the fourth century, and in excellent preservation. The half-dome roofing in the apse was frequently filled with similar work. Occasionally a transept was introduced in front of the apse, the elongation of which gave the cross-like form so much adopted in later times for church architecture. Large basilicas (as old St. Peter's, or St. Paul's Without the Walls, at Rome) had five aisles. All basilicas had either a flat wooden ceiling, generally with beams of wood richly carved and gilt, separated by carved panels, or (as in San Miniato, Florence) they showed the rafters of the roof; which were ornamented with some simple coloured patterns in this case.

The bishop's throne, with seats for the principal clergy, occupied the apse or tribuna (their stone seats in the cathedral of Torcello, Venice, still remain in a perfect condition); the altar (generally covered by a baldacchino) stood just in front of the apse, where in the old Roman basilicas the emperor's statue had stood; and in front of the altar a square space was railed off for the accommodation of the lower clergy, who chanted the service, whence this space was called the choir. This construction with AMBO, &c., in a very perfect state, may still be seen at the Church of San Clemente at Rome. On each side, close to the tribuna, a space was reserved in the nave for men of rank on one side, and women of rank on the other. At the opposite end of the basilica was a narrow space inclosed by a barrier the whole width of the church. This space was the *narthex* or "scourge," and was for the use of penitents. The name was also extended to the outer court which lay before the entrance to the church, and in the midst of which (or in the midst of the true *narthex*) was placed the *cantharus* or bowl for washing the hands, in symbolism of the purification to be gained by prayer. See BAPTISM.

Old St. Peter's, a plan of which will be found in our Plate on Basilican and Byzantine Architecture, shows the points named very clearly, except the railed-off clergy-space. The apse, tribuna, altar, transept, two ambos (one for Epistle and one for Gospel), the outer court or *narthex*, in the centre of which stood the *cantharus*, are all most clearly shown. As it was a full-sized basilica a scale is appended.

Under the tribuna, in very many basilican churches, extends a large crypt, wherein are placed the most important relics of the church, as the body of St. Peter, under the high altar of St. Peter's; that of St. Paul under the high altar of St. Paul's Without the Walls, &c.

The decoration of basilican churches is nearly always internal, and consists of fresco or mosaic, the latter frequently on a gold ground. Their long perspective is always solemn and imposing; though the columns of the nave are more often irregular in size and shape than not, being for the most part spoils of some heathen temple.

Not only the apse, but the general form of the nave and aisles of our ancient cathedrals is evidently borrowed from the Italian church basilica. The same is also true of the old village churches of England. The nave corresponds to the testudo, and the side aisles to the porticus; the windows of the nave, which externally are seen as a clerestory above the lean-to roof of the aisles, correspond to the opening between the upper part of the columns of the testudo.

Modern basilicas exist at the present day in Italy, applied, as the ancient were, to civil purposes. Palladio gives the name of Basilica to such public buildings, many of which are found in the Italian towns.

BASILICA (*Basilicos nomos*), a Greek code, which was commenced about A.D. 876 by the Emperor Basilus I., who is sometimes said to give it its name, and completed by his son, Leo VI. the philosopher. The emperor's name, *Basilios*, however, would not give *Basilikos* as an adjective; and doubts are now thrown upon this etymology. No other satisfactory origin of the name has as yet been proposed. It was revised by the order of Constantine VII. about A.D. 945. The Basilica comprised the Institutes, the Digest or Pandect, Code, Novellæ, and the Imperial Constitutions made after the time of Justinian, in sixty books, which are subdivided into titles. The extracts from the Digest are placed first under each title, then the constitutions of the Code, and next the extract from the Institutes and the Novellæ. The Basilica does not contain all that the Corpus Juris contains, but it contains some things which are not in the Corpus Juris.

An edition of the larger part of the Basilica, by Fabrot, was published at Paris in 1647 (seven vols. folio). A new edition by Heimbach was published in 1843-47 (five vols. 4to, Leipzig).

BASILIDES, a famous Gnostic who lived and taught in Egypt during the first half of the second century. It would appear from quotations (the original works being lost) that he held the notion of two primitive principles—one of good or light, and another of evil or darkness. The good principle or being, with his seven æons or emanations—*i.e.* the mind, the word, the understanding, power, excellencies, princes, and angels—formed the blessed *ogdoad*, or combination of eight. From each of these sprang other emanations, making the number 365, the mystic number of the Gnostics. In Greek numerals this was expressed by the letters *abracax* (probably the origin of the mediæval conjuring word *abracadabra*); and each angel being supposed to govern a world, the whole series of angels and worlds, making together the Supreme Being, was represented by this number or symbol. The opponents of Basilides assert that he taught the doctrine of Antinomianism, and that his followers practised magic, but there is no evidence of this beyond their accusations.

BASILISK (*Basiliscus*), a genus of LIZARDS belonging to the IGUANIDÆ, and confined to America. The basilisk or cockatrice of ancient days (see the next article) was the "king of dragons and serpents, whose breath withered up all vegetation, and whose very look was fatal to man." After this it is disappointing to find that the basilisk of modern naturalists is perfectly harmless.

The basilisk is closely allied to the iguana, but differs in wanting femoral pores, and in having only the rudiment of a dewlap under the throat, which is succeeded by a well-marked transverse fold. A triangular elevation of skin, sustained by a cartilage, rises vertically from the middle longitudinal line at the back of the head, giving a singular aspect to the animal, which appears to be wearing the crown

though no longer wielding the power of the old dragon king. The body is covered with small keeled scales, disposed in transverse bands; those of the under parts are larger. The back and tail are furnished with a high compressed crest, which is much more distinct in the males than in the females, and is supported by bony rays. The tail is long and compressed, and the outer hinder toes are webbed at their base. The tympanic membrane is large and oval. The palate is furnished with teeth.

The Hooded Basilisk (*Basiliscus mitratus*) is a native of Guiana and other parts of South America. It attains to a considerable size, measuring upwards of 2 feet in length. Notwithstanding its formidable appearance it is in reality exceedingly harmless, and feeds principally upon grains and fruits. Like the iguana, it is arboreal in its habits, and is active on the branches of the trees; but it often takes to the water, and lashing its long compressed tail from side to side, swims with great ease and rapidity. The conical cap of skin is capable of being inflated with air or emptied at pleasure, as is the large dewlap of the iguana. It is the male of this species that is so remarkable for the development of the dorsal crest. The general colour is of a yellowish brown, passing into white beneath; a longitudinal stripe of white edged with black extends from each eye to the sides of the black, and there bleeds with the general tint; the throat is marked with bands of lead colour, and this tint prevails on the sides of the neck.

BASILISK, one of the monsters of mediæval times, a fabulous creature like the dragon, or the griffin, or the cockatrice, rude coarse imitations of the classical Hydra, Pegasus, Chimæra, &c., which lend charms to Greek myth. The basilisk and cockatrice were practically two names for the same fabulous creature. Shakspeare alludes in several plays to the popular belief in this once dreaded animal, as in "Cymbeline".

"It is a basilisk unto mine eye
Kills me to look on't;"

and "Richard III."—

Richard—"Thine eyes, sweet lady, have infected mine.
Anne—Would they were basilisks, to strike thee dead."

In his note on the last passage Mr. Aldis Wright suggests that the name cockatrice is a corruption of crocodile, through the French *coqatrice*, Spanish *coacatiz*. The following passage from Topsell's "History of Serpents," published in 1658, gives the monstrous story invented to explain the name, and believed even by the learned men of the seventeenth century:—"There is some question amongst writers about the generation of this serpent: for some (and those very many and learned) affirm him to be brought forth of a Cock's Egge, which Egge, afterwards set upon by a Snake or a Toad, bringeth forth the Cockatrice, being half a foot in length, the hinder part like a Snake, the former part like a Cock, because of a treble comb on his fore-head. Among all living things there is none that perisheth sooner than doth a man by the poyson of a Cockatrice, for with his sight he killeth him, because the beams of the Cockatrice's eyes do corrupt the visible spirit of a man, which visible spirit corrupted, all the other spirits coming from the brain and life of the heart are thereby corrupted, and so the man dyeth." Sir Thomas Browne ("Religio Medici") says it was called basilisk (Gr. *basilikos*, royal) from a crown-like crest on its head, and was the most deadly of serpents or lizard-like things. It had both shapes, for, says Sir Thomas, "our basilisk is generally described with legs, wings, a serpentine and winding taile, and a crist or comb somewhat like a cock. But the basilisk of elder times was a proper kind of serpent, not above three palmes long, as some account, and differenced from all other serpents by advancing his head and some white marks or coronary spots upon the crown, as all authentic writers have delivered." Sir Thomas Browne goes learnedly into the question of the possibility

of this fatal power of the eye, and from the action at a distance of infectious diseases, or the fabled deadly shadow of the upas-tree, &c., he inclines to believe it possible. The Hebrews had a similar monster, more deadly than the "pethen" (Gr. *aspix*, asp), which they called Tzepli'a or Tzipl'honi, and which is variously translated in the Authorized Version of the Bible as *cockatrice* (Isaiah lix. 5), as *adder* (Prov. xxiii. 32; Job xx. 14), and as *serpent* (Prov. xxiii. 32; Isaiah xi. 8). The creature has served many a poet—

"The basilisk, when roused, whose breath,
Teeth, sting, and eyeballs, all are death."
—King, "Art of Love."

BASIL'US I., the Macedonian, Emperor of Constantinople, was born of poor parents in a village of Macedonia towards the beginning of the ninth century. He claimed to be descended from the ancient Parthian kings, the Arsacids, though whether rightly, or only from false pride, it is not now possible to determine. When twenty-five years of age he proceeded to Constantinople, where he acquired the favour of the Emperor Michael III., became his chamberlain A.D. 861, and married one of Michael's concubines, at the same time consenting to induce his own sister to occupy the shameful position thus rendered vacant. It is perhaps a little palliation to add that in no other way could the licentious Michael's favour be gained but by pandering to his horrible and extravagant vices. In 866 Michael made Basilus his colleague in the empire, and in the following year was murdered by him. No man's life was safe from Michael's caprice. Basilus was in momentary danger, emperor though he was, and had been still further degraded by the appointment of a third emperor, formerly a galley slave. It is but just to remember this, and also to consider the unanimous public approval of what appears to us like a crime.

Basilus was proclaimed emperor, and his conduct on the throne was wise and equitable. He re-established order, enforced the strict administration of justice, corrected the abuses that had crept into every branch of the administration under the profligate reign of Michael, and began the compilation of a code of laws which was completed by his son and successor, Leo. It is remarkable, as Gibbon points out, how closely his conduct resembles that of the Emperor Augustus. He ruled like a father that country of which he became possessed by violence and crime. He found a disordered state and left an orderly government. [See **BASILICA**.] He dismissed the intriguing Photius, who had usurped the patriarchate, and re-established the patriarch Ignatius. He assembled a general council at Constantinople in 869, to which Pope Adrian II. sent his legates, and in which Photius was condemned, and a temporary reconciliation between the Eastern and Western Churches effected. He recovered the greater part of Asia Minor from the Saracens, and carried the arms of the empire beyond the Euphrates in 872. Basilus made a treaty with the Russians of Kiev, and sent them an archbishop, who converted many of that nation to Christianity; and from that time the Russians acknowledged the authority of the Greek Church. At the end of 877 Ignatius died, and Photius being restored by Basilus to the patriarchal see, fresh dissensions broke out between the Greek and the Roman Churches. Basilus died in 886 of a blow which he received from a stag while hunting.

BA'SIM (Wasim), a British district in Berar, under the jurisdiction of the Resident at Hyderabad in the Deccan, lying between 19° 26' and 20° 31' N. lat., and between 76° 39' and 78° 7' E. lon. The extreme length from north-west to south-east is about 61 miles. The area is 2958 square miles, and the population 280,000. The ancient town of Basim is the administrative headquarters. A good metalled road connects it with Akola station on the Great Indian Peninsular Railway, 50 miles north.

Basin, the more westerly of the two *taluks* of the district, is a rich table-land, about 1000 feet above sea-level; Pussad, the eastern *taluk*, is mainly a succession of low hills covered with poor grass. Many of the hill peaks rise to a height of 2000 feet. Iron ore is plentiful throughout the high lands. Several of the forest trees yield gums, dyes, and medicines, and the jungles supply abundant fuel. The mango, the *unhuu*, and other fruit-trees are found in all the village lands except those of the western *parganas*. The two principal rivers are the Pus and the Kata Purna, mountain streams which rise close to each other at the village of Kata, north of the town of Basim. The larger wild animals are tigers, leopards, bears, wild hogs, and several varieties of deer; small game abounds. The staple crops are cotton and *jaar* (great millet), neither of which require much rain. The cotton is all *banni*, or the best and earliest kind. Considerable quantities of coarse rice are grown on irrigated land, which has to be manured for the crop. The chief manufactures of the district are coarse cotton cloth, blankets, and a little paper. The climate is preferred to that of the other districts in Benar; the hot wind which blows during the day in the summer months is succeeded at night by a cool breeze.

BA'SIN is a geographical term which is used in such expressions as the "basin of a sea," the "basin of a lake," the "basin of a river," and it includes all the countries drained by the waters that run into such sea, lake, or river. Professor Huxley says wittily ("Physiography," 1880) that although it is manifestly necessary that there is a dip inwards (otherwise the water would not collect in the basin), this depression is so gradual that it should rather have been called a *dish* than a basin.

If what we might call the rim of the basin of a sea runs far inland, and comprehends a great extent of country, it commonly contains large and fertile plains, maintains a numerous population, and at some period of history civilization has made considerable progress within its limits. Thus the basin of the Bay of Bengal comprehends countries not much less than half of Europe in extent. Accordingly we find not only that it is, and ever has been, much frequented by vessels, but also that at a very early period civilization made considerable progress, and that at all times the arts of peace have been greatly cultivated within its limits. On the other hand, if the land part of the basin of a sea is of small extent, the country is poor, its inhabitants backward in civilization, and its ports deserted. Such is the case with the Arabian Gulf, of which the edge of the basin commonly coincides with its shores, and in no place probably extends more than 20 miles inland. It is true that many ships now, as in ancient times, navigate the gulf; but it must be recollected that this activity is (now as formerly) caused by the trade between Europe and India, and not by any inducement found in the basin of the gulf itself.

The basins of lakes offer likewise several varieties. Mountain lakes have in general a very narrow basin, being inclosed on all sides by mountains. Many of them receive a river at one extremity, in which case their basin runs up such river to its source. The lakes of plains have, in general, a much larger basin, as they receive the drainage of a more extensive country (as the lakes of North America and those of Russia).

The basin of a river is commonly widest in the middle of its course, where it receives the most and the largest tributaries. At the source, and towards the mouth, the basin grows narrower. But this rule is subject to exceptions. The basin of the Nile exceeds 1000 miles in width in the upper part of its course, but in the middle of its course it is in many places less than 15 miles in width. The Danube, on the other hand, preserves nearly the same width at its mouth as it attains higher up in its course. The internal structure of the basin requires examination. Most rivers

traverse a country which rises slowly towards their sources, and the ascent is only rapid in the upper part of their course; but some rivers, after issuing from the mountains which give them origin, traverse in their course to the sea plains of different elevation. Thus the Danube traverses three extensive plains—those of Bavaria, of Hungary, and of Bulgaria—which are respectively 1000, 800, and 100 feet above the sea-level. Plains of such different elevation above the sea must of course differ materially in productions, soil, and climate. Whenever a river, with its tributaries, traverses an extensive basin, the surface of this basin in general presents a great variety of geological formations.

BA'SIN. In geology, depressions of the strata occasioned by synclinal dips are thus designated, especially such as are on a large scale. In the area known by this name the strata dip from two opposite sides, attaining their greatest depths in the centre. Thus the Tertiary basins of London, Hampshire, and Paris, resting on chalk; the coal-basin of South Wales, resting on old red sandstone; and in a larger sense the European basins between the Ural, the Scandianavian chains, and the Pyrenees, Alps, &c. The strata were originally deposited in horizontal layers, and have acquired their configuration from elevations and depressions of particular geographical areas.

BASING HOUSE. See BASINGSTOKE.

BA'SINGSTOKE, a municipal borough and market-town in Hampshire, 48 miles from London by the South-western Railway. It has a considerable trade from its standing at the junction of five roads, and being also an important railway centre. The town is pleasantly situated in the midst of a fertile and wooded district. The church is a spacious and handsome building. There are chapels for all denominations of dissenters, several schools, a mechanics' institute, town-hall, and a corn exchange which is considered one of the best in the county, and the large room of which is used for meetings, concerts, &c. The charities are numerous, and on the east of the town is a tract of common land 108 acres in extent, over which certain householders have the right of pasturage. The malting and corn trades constitute the principal business of the place, but a good trade is also carried on in coals and timber, and there are breweries, an iron-foundry, and a manufactory of agricultural implements. The population in 1881 was 6681.

In the early period of the Saxon dynasty Basingstoke was inferior to Old Basing, but at the time of the Conquest it had obtained the superiority. According to Domesday Book, it was a royal manor which had never paid tax or been distributed into hides, and had at the survey a market worth 30s. In 1261 Henry III. founded a hospital here for the maintenance of six aged and impotent priests; its site was on the north side of the river, but not a vestige of it now remains. In the reign of Henry III. Sir William, afterwards Lord Sandys, in conjunction with Fox, bishop of Winchester, instituted a guild and erected a beautiful chapel here, which he dedicated to the Holy Ghost. This fraternity was dissolved in the reign of Edward VI., and the revenue was vested in the crown; but in the reign of Mary it was re-established, and the revenue appropriated to the maintenance of a priest, for the celebration of divine service and the instruction of young men and boys belonging to the town. During the civil war in the reign of Charles I. it was suppressed by Cromwell, and the estates were seized by the Parliament, but through the intercession of Dr. Morley, bishop of Winchester, they were restored in 1670, and appropriated to their former use, and are now enjoyed by the Free School. Basingstoke sent members to Parliament from the 23rd Edward I. to the 4th Edward III., when, at the solicitation of the inhabitants (it is supposed), the privilege ceased. John de Basingstoke, a distinguished scholar of the thirteenth century; Sir James Lancaster, the navigator; and Joseph and Thomas Warton—one the poet

laureate and the other head-master of Winchester—were born in the town.

BASING HOUSE, Pawlet, Marquis of Winchester's mansion, stood, as the ruined heaps still testify, at a small distance from Basingstoke. It was called in jest *Basting House* by the jubilant cavaliers, for in the great civil war it stood siege after siege from the Roundheads; and further, it protected the great west road. Thus there came to be a kind of passion on the Parliament side to take Basing House; and this work was given to no less a man than Lieutenant-general Oliver Cromwell. We learn from the narrative of Peters, related by desire to the House of Commons, that the lieutenant-general "spent much time with God in prayer the night before the storm;" and in a letter dated 11th October, 1645, which was read for joy in all the churches on the next Sunday, Cromwell begins in the same spirit—"I thank God I can give you a good account of Basing House." There were, indeed, two houses, the older some 200 or 300 years old, both of them "surpassing in beauty and stateliness;" and Mr. Peters waxes eloquent over the huge store of provisions, "for years rather than for months," and over the princely appointments, as of a "bed costing £1300," &c. The defence was desperate, but no defence availed against the fiery attack of the lieutenant-general. The wall, a mile round, was carried by storm, and after a sharp morning's work all the garrison were slain or prisoners. The marquis was amongst the latter, stoutly averring that "if the king had had no more ground in England but Basing House he would adventure as he did, and so maintain it to the uttermost, for *Basing House was called Loyalty*." The soldiers were allowed to plunder till nightfall, and the remaining contents were then sold to the country folk round, who came for it in carts. Even the lead gutters were pulled down; "and what the soldiers left the fire took hold on, leaving nothing but bare walls and chimneys in less than twenty hours—being occasioned," says Mr. Peters, "by the neglect of the enemy in quenching a fire-ball of ours at first." Cromwell writes—"I humbly offer to you to have this place utterly slighted, for these following reasons:—It will ask about 800 men to manage it; it is no frontier; the place exceedingly ruined by our batteries," &c. Whereon the Parliament decreed that Basing House was to be carted away: "Whoever will come for brick and stone shall freely have the same for his pains." (*Commons Journals*, 15th October, 1645; Sprigg's "*Anglia Rediviva*," London, 1647; "Cromwell's Letters and Speeches," by Carlyle, third edition, London, 1849.)

BASKERVILLE, JOHN, a celebrated printer, was born at Wolverley, in Worcestershire, in the year 1706. He does not appear to have been brought up to any particular business. In 1726 we find him keeping a writing-school at Birmingham, and in 1745 he engaged in the japanning business at the same place, by which he acquired considerable wealth. His taste for literature and the arts connected with it led him to direct his attention towards the improvement and perfection of the art of printing. The most obvious improvement to be effected was in the shape of the letters. Caslon, previous to Baskerville's attempts at letter-founding, had cut a variety of matrices of more beautiful shapes than those of the Dutch types which, up to this time, had been imported into England. Baskerville carried the art to a higher degree of perfection; and even now his types would, in many respects, be considered models. By his unceasing efforts the art of printing was raised to a degree of perfection previously unknown in this country. His printing establishment does not appear to have been profitable to him. From a passage in a letter to Walpole it would appear that in 1762 he was desirous of withdrawing from the business. After 1765 little or nothing issued from his press. It is most likely that the typographical improvement which he was the means of effecting was not sufficiently appreciated at the time, and consequently

that his efforts were not very liberally encouraged. The editions of his works are now, however, highly prized. Baskerville died in 1775.

BAS'KET, a receptacle for domestic use, made by intertwining reeds, osiers, &c. The name is derived from the ancient British *basged* or *basgared*, a netting or weaving of splinters. The word used to be written "baskett." Thus Chaucer—

"For I wol preche and beg in sondry londes,
I wol not do no labour with min londes,
Ne make *baskettes* for to live thereby,
Because I wol not beggen idelly."

The art of basket-making is one of great antiquity, and it is also one of the most widely spread. Baskets are referred to in the Old Testament at a very early period, the ark of bulrushes used by Jochebed, the mother of Moses, being probably a kind of basket woven closely and plastered with bitumen on the outside. One of the most curious of the Babylonian tablets of the British Museum, first deciphered by Mr. George Smith [see *BABYLONIA*] relates the very similar story of Sargon, king of Akkad, 1600 B.C.

"My mother the princess conceived me;
In difficulty she brought me forth:
She placed me in an ark (basket) of rushes,
With bitumen she hid she sealed,
She launched me on the river," &c.

Fragments of basket-work are occasionally found in the prehistoric lake dwellings of Switzerland, while the baskets made by the ancient Britons were highly valued by their Roman conquerors. At the present day most of the uncivilized tribes of Africa and North and South America are skilful basket-makers, some of the latter continuing to weave their material so closely that the vessels serve to hold water. Various roots and plants are hid under contribution for this purpose; canes and split bamboo are largely used in India, China, and Japan, and in Europe enormous quantities of willow shoots are annually used up in basket weaving. In some parts of England and Scotland extensive estates are planted with willows which are cultivated for basket weaving, and the reeds most highly esteemed for this purpose are grown in England. Notwithstanding this, baskets to the value of £40,000 are annually imported into the United Kingdom from the Continent. Basket-making is found to be one of the occupations most profitably carried on by the blind, and forms an important part of the industry of almost all blind asylums.

BASLE. See *BASEL*.

BASNAGE, JACQUES DE BEAUVAL, the eldest son of Henri de Basnage, born at Rouen, 1653, was the most celebrated member of a distinguished Protestant family. He was sent when very young to Saumur, to study under the famous Tanaquil le Fèvre, and became the favourite pupil of his master. He studied theology at Geneva and at Sedan. On his return to Rouen he was received into the ministry in September, 1676, and became pastor of the reformed church in that city. He married, in 1684, Anne du Moulin. The church at Rouen being closed by authority in June, 1685, Basnage obtained permission from the king to retire to Holland, and accordingly he settled at Rotterdam, in which place he was a stipendiary minister, until, in 1691, the consistory, influenced by Heinsius, appointed him pastor of a church at the Hague. At the Hague he not only exerted himself in his religious duties with indefatigable zeal, but was also employed in state affairs. Basnage was the friend of the Grand-pensionary Heinsius, and while in Rotterdam had a weekly meeting with Pacts, Bayle, and other scholars. He carried on a correspondence with several princes, noblemen, and ministers of state, and with many scholars in France, England, Germany, and Italy. He was scarcely less esteemed by Catholics than by Protestants. Voltaire said that Basnage was fitter to be a minister of state than of a parish. He died in 1723, aged seventy-

one. His chief works are a favourite treatise on the Holy Communion (1688), a "History of the Jews," in five vols. (1706), and an essay on Duels and Orders of Chivalry (1720), all printed (in French) in Holland. There is an English translation of the History by Taylor (1708).

BASQUE LANGUAGE. This language, *Léngua Bascongada*, called also by the Spaniards *Basconce* and *Vizcaino*, is spoken by the people who inhabit the Basque Provinces and part of Spanish and French Navarre—that is, the countries lying in the angle of the Bay of Biscay. The people call themselves *Euskaldunak*, and their language *Euskara*. The testimonies adduced to prove that the Basque language was spoken by all, or nearly all, the primitive inhabitants of Spain and Portugal, and the south of France before the invasion of Aryan tribes, are so numerous and conclusive as to amount almost to a demonstration. The etymology of the words denoting the ancient names of mountains, rivers, and towns, in almost every part of the peninsula, is one of the strongest proofs. The examples of words in which the first element appears to be Basque are perhaps the most striking; such is *archa*, *aitza*, a rock, which in names of places assumes the form *asta*. Modern names which contain the element are, Asteguieta, Astobiza, Astorga, &c.

The Basque is entirely unrelated to any other known tongue. It is of exaggeratedly agglutinative type, incorporating into its verb a variety of relations which are elsewhere expressed by independent words. [See AUXILIARY VERBS.] Besides terminations equivalent to all those existing in English, it has frequentative, diminutive, and augmentative terminations, like the Spanish and Italian. Verbal nouns are formed with the termination *ari* or *arja*, to denote a physical actor, and *lia*, to denote a moral one; *gida*, "to guide," *asla*, "to teach." For the abstract substantives it has likewise two terminations, *tassuna* and *querija*; the former denotes a natural, and the latter a moral quality, defect, or perfection. Thus, *zorata* denotes madness, as a physical derangement of the mind; *zorakerija*, an inclination to madness from a strong passion; and so on almost *ad infinitum*. The Basque substantives have no sign to express the relation of gender. There is but one article, which is *a* for the singular, and *ac* for the plural. This sign forms the characteristic of nouns as to number, and is in all cases affixed to the substantive—as *guizonak*, "man-th"; *guizonak*, "men-th." As the proposition is always affixed to the noun, they may be said to exist as many cases as there are propositions.

The moods of the verb are eleven, and the tenses, according to some Basque grammarians, amount to forty-six. Every verb can be conjugated in twenty-six forms, showing the different relations of the agent to the action and to the object which it affects. The relation of the speaker to the person spoken to is also expressed by particular terminations. Thus there are five different terminations, viz. from an inferior to a superior, from a man to a woman, and *vice versa*, and also between equals. The syntax is very simple, and subject to fixed rules. In every sentence the substantive is placed first, then the article, then the adjective, then the adverb, followed by the verb, and lastly the object, with the preposition affixed to it. Example:—*Seme oquer bat-ec enon-d-eus-euz arduraue ec*; the literal meaning—"Son-crooked-one, given-us-has-to, cares these;" which means, a bad son has caused us these troubles. This order is that in which, generally speaking, an illiterate Basque places the words when he attempts to speak Spanish, for which reason the Spaniards call *concordancia Vizcaina* a bad construction.

The Basques appear to be a Caucasian race; their skin is "white" and their features regular, but their speech cuts them off irrevocably. The problem of their origin has been attacked many times, and still affords battleground to philologists and ethnologists.

BASQUE PROVINCES, THE (*Las Provincias Vascongadas*), are situated in the north of Spain, and consist of the provinces of Alava or Alava and Guipuzcoa, and the señoría of Vizcaya or Biscay. Alava, the most southern of the three, is bounded S. by the Ebro, W. by the province of Burgos, E. by that of Navarra, and N. by the sierra, or mountain chain, which forms the continuation of the Pyrenees westward. Biscay, Guipuzcoa, and a very small portion of the north-western part of Alava, lie to north of this sierra, and between it and the Bay of Biscay. The señoría of Biscay has on the west the province of Santander, and on the east that of Guipuzcoa, which is itself bounded E. by Navarra and the French department of Basses Pyrénées. The Basque Provinces form a pretty regular triangle, the altitude of which from the Ebro to the Bay of Biscay is about 67 miles, and the base, which rests on the bay, is about 90 miles. The united area is 2971 square miles, of which Biscay contains 1267, Alava 1082, Guipuzcoa 622. The population in 1883 was—Biscay, 190,000; Alava, 93,000; Guipuzcoa, 167,000; total, 450,000. Guipuzcoa is one of the most densely peopled of the Spanish provinces. The surface of the Basque Provinces, which is of a similar character throughout, consists of numerous ranges of mountain sent off from the main sierra and intersected by valleys, which are drained by numerous small streams. In Biscay and Guipuzcoa, the rivers all flow north into the Bay of Biscay; the largest of them are (proceeding from west to east) the Nervion or Nerva, the Cadagua, the Mundaca, the Lequeitio, the Ondarron, which separates these two provinces; the Deba, the Urola, the Oria, the Urumea, the Oyarzun, and the Bidassoa, which separates Guipuzcoa from France. The rivers of Alava flow into the Ebro. The most important of these is the Zadorra. The mountains

are generally calcareous, but in some places they consist of sandstone and slate. They abound in excellent pastures; their high slopes are crowned with forests of oak, and in many places of chestnut, the fruit of which is used as food in the country, and also exported. The valleys consist of a rich clay soil. The people are not very industrious. Most of them are engaged in agriculture, which is better understood than in many parts of Spain. Oxen are used in ploughing, but spade husbandry is chiefly adopted. The peasantry live generally in *caserios*, or hamlets of six or eight houses. Each farmer is the proprietor of the land he tills. The chief crops raised are wheat, barley, oats, maize, fruits, hemp, flax, and pulse. Some poor wine called *chacoli* is made; but the common beverage is cider, apples being very abundant. The chief iron-mines and smelting furnaces of Spain are in these provinces. The ores are very rich; those of Somorrostro yield 33 per cent., those of Mondragon 40 per cent. of metal. The mines are worked chiefly by English, French, or German companies. Copper, tin, marble of different colours, and jasper are also found. The preparation of charcoal, and the important fisheries on their long extent of sea-board, afford employment to those not engaged in tillage or in the iron-works. The number of corn-mills for grinding flour, which is one of the principal exports, is very great. The climate of the Basque Provinces is damp and enervating, and very changeable.

The Basque nation is certainly the first that settled in the Spanish peninsula, as far as historical evidence goes, but its origin is unknown. Humboldt considers the modern Basque nation as the representative and the descendants of the great nation of the Iberi, who were spread over the whole peninsula and spoke one language, modified into different dialects.

In the time of the Romans the people now called Basques were called Vascones, and in the fifth century of our era they were known by the name of Varduli (*Diccionario de la Academia*, art. "Alava"). The territory which they occupied in ancient times extended on both sides of the Pyrenees, and comprised the three Basque Provinces, and

both Spanish and French Navarre (Strabo, iii.; Pliny, iii. 20). They were the only Spaniards who preserved their independence, not having been subdued by any of the nations who invaded the peninsula. A body of Vascones is mentioned (Tacit. "Hist." iv. 33) as serving against Civilis and the Batavi. No less obstinate was their resistance against the Goths, their final conquest being only effected A.D. 580. The Arabs were never able to penetrate into their fastnesses, and the Christians found in those mountains a shelter against the Mohammedans. In the year 1200 Alfonso VIII. of Castile, in his wars against the King of Navarre, invaded Alava and Guipuzcoa, and those provinces were united to Castile, the king taking the customary oath to maintain their privileges.

The government of the Basque Provinces differs entirely from that of the rest of the peninsula. Every province has its own constitution and a separate government, not differing much in spirit and form from each other. Delegates from the three parliaments meet annually to consider the common interests of the provinces. They employ a seal representing three interlaced bands, with motto "Irraibat" ("the three are one"); but no written federal pact exists.

The chief privileges of the Vizcayans consist in paying no taxes except those levied by their own juntas; in every Vizcayan being by birth an *hidalgo*, or gentleman, and acknowledged as such in every part of Spain; in not being subject to any tribunal, or to any other laws, either in their own province or in any other part of the peninsula, than their own; and in having a judge resident at Valladolid for the administration of those laws in cases occurring out of the province; in being exempt from military service, except in the defence of their own country. The possession of these privileges has occasioned much trouble in Spain, where it has been often endeavoured, hitherto without complete success, to reduce them within the general system of the country.

The Vizcayans and Guipuzcoans are the best sailors in the peninsula, and skilful in commercial transactions. They are very active and industrious; their chief occupations are agriculture, commerce, and the manufacturing of iron. The women assist the men in the cultivation of the ground, and are remarkable for their cleanliness. The dress of the men and women is similar to that of the mountaineers of Castile; both wear abarens, a species of shoe which is made of a hard and untanned piece of hog-skin, or that of any other animal, which they soften by soaking it in water, and then cut it into pieces of the size of the foot, which they fasten on with strings.

The Basques are generally found among the upper and more trusted servants in civil life, and in the army and navy they make excellent petty officers.

In 1873 a scheme of visionary reform was proposed by the Madrid government, which included, amongst other interferences with Basque privileges, the incorporation of their three provinces with Navarre as a single state. This aroused the greatest alarm on the part of the Basques for the safety of their peculiar and, in the main, very excellent system, and caused them to take a very prominent part in the Carlist insurrection which broke out in that year, and was not suppressed till 1876.

BASQUES, LE PAYS DES ("the Country of the Basques"), the name formerly given, from the name of its inhabitants, to a district in the south-western corner of France. It is at present comprised in the department of Basses Pyrénées. See **PYRÉNÉES, BASSES**.

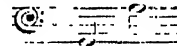
BAS-RELIEF. The Italian term *basso-rilievo*, or the French *bas-relief*, is commonly applied to any work of sculpture connected more or less with a plane surface or background, and in this general sense is opposed to insulated detached figures, or sculpture in the round. In its more particular meaning *basso-rilievo*, low or flat relief, is usually appropriated to figures which have a very slight

projection from the ground. *Alto-rilievo*, on the other hand, is not only rounded to the full bulk, but has generally some portions of the figures quite detached; and *mezzo-rilievo* (a style between the two), although sometimes rounded to a considerable bulk, has no part entirely unconnected with the plane surface or ground.

In carefully keeping within the limits, however narrow, which defined the style of *rilievo*, the great artists of antiquity failed not to condense into that style the utmost perfection compatible with it, while the various applications of the works suggested abundant variety in their treatment and execution. The British Museum contains unquestionably the finest existing specimens of this branch of sculpture in the *rilievo* which decorated the Parthenon, or Temple of Minerva, at Athens. The so-called "Gates of Paradise," by Ghiberti and Pisano, at the Baptistery at Florence, are perhaps the finest specimens of *bas-relief* between the ancients and Flaxman and Thorwaldsen in our own day.

BASS, in music, is the opposite to treble. The grave notes, or notes which are produced by less than about 200 vibrations per second, form the *bass*, those of higher vibrations the *treble*. The note called "middle C" (with 256 vibrations) may be said to divide the two. The word is a contraction of the Italian *basso*, low. The kindred English word *base* was used in earlier times with precisely the same meaning both musically and in general speech, but the contracted Italian form has now quite superseded the native word. We proceed to give some special musical applications of the word.

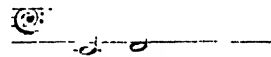
The **BASS STAVE** is that stave of five lines which has upon its fourth line the *F* clef.



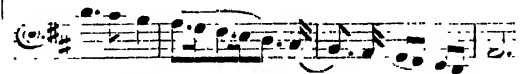
The *F* clef (sometimes incorrectly called the Bass clef) represents the *f* with 170.6 vibrations per second, and is in fact the letter *F* written across the line, and changed by successive modifications into its present form. For the relative position of this clef to the others, see **CLEF**.

The notes of the bass stave extend from the *G* marked in the above example, with 96 vibrations per second, to the *a* in the same example, with 213½ vibrations.

The **BASS VOICE** is the lowest voice of men. Its extreme compass is from *E* or *F* to *e'* or *f'* for ordinary



first-class chorus singers. Solo singers have frequently much greater ranges. Ordinary voices range from *G* to *e'* or *d'*. Purcell writes down to *D* and up to *e'* in his celebrated anthem, "They that go down to the sea in ships," and the lower note is touched more than once. We give one passage out of several:—



They that go

In ships, &c.

In another work Purcell repeatedly touches the upper *f'* in the bass voice part; while Chrysander ("Händel," i. 244) quotes a still more extraordinary phrase from an early setting by Händel of "Acis and Galatea," that cantata which in the final arrangement by the great master still affords unmixed delight. The song for Polyphemus (Polifemo) has this passage:—



Acis.

Here we may explain the high *a'* by the singer using the falsetto voice; but no such trick would serve for the low *C*. We are therefore forced to the conclusion that the voices of former times were more extensive in compass than those of the present day.

The **BASS PART** of a series of harmonies is the lowest part, simply, without reference to its actual acuteness. Thus in the following—



the lower notes of the pair are the bass of the harmony, although they actually are high in the treble staff. Here the word bass means "lowest." There are many special rules as to the proper conduct of a bass part, for this is often much fettered, while upper parts are quite free; the reason being that a harmonist has to build his whole construction on his bass, and the part must therefore be rigidly correct to be suitable for so important a function. In text-books on harmony the exercises are always given as *basses*, wherein the learner constructs chords according to the rules, and the art of **HARMONY** is hence often called "thorough bass." The fitting of an accompaniment to a melody belongs rather to **COMPOSITION**; and though it appears perhaps to one unacquainted with the art to be the more important thing, the study of harmony—that is, the study of the proper accompaniment of a *bass*—is by far the most necessary and fundamental exercise; indeed it precedes all other theoretical musical instruction.

BASS, an island, or rather great rock, in the Frith of Forth, about a mile and a half from the shore of Haddingtonshire, in 56° 5' N. lat., 2° 36' W. lon. It is a mass of granular greenstone. It is nearly of a round shape, about a mile in circumference, and rises 313 feet above the sea. The surface is about 7 acres. Towards the south, that is, opposite the mainland, it declines with shelving rocks to the water, and there affords the only landing-place, which, however, is not without difficulty, even in calm weather. Towards the north, and also on the east and west, it rises perpendicularly out of the sea, and in some places the precipices hang over. A caverned passage runs through the rock, which may be sailed through when the sea is calm. Some writers have said that upon the top of the rock there is a spring, but this is not in reality the case. The island affords pasture for a few sheep, but it is principally remarkable for being frequented by flocks of aquatic birds, which continue there during the summer. Of the birds which frequent the rock, the solan geese (the *Pelecanus bassanus*) are the most abundant and interesting. They arrive in March and take their departure in September. Large numbers are taken and killed for their feathers and fat. There are remains of a fortress and of a small chapel on the rock. In 1406 Robert III. placed his son, afterwards James I. of Scotland, on the Bass, till a vessel could be procured to convey him to France. Thence he embarked, and was captured by direction of Henry IV., and retained nineteen years a prisoner in England. The Bass was purchased by the English government in 1671, from Sir Andrew Ramsay of Abbotshall, the proprietor, and was used as a prison for the Covenanters under Charles II. and James II. It was the last place in Great Britain that held out against William III. In 1701 he directed the fortifications to be destroyed, and in 1706 it was granted by the crown to President Sir Hew Dalrymple, with a reservation of the power of renewing the fortifications if at any time the English Government should desire to do so.

BASS INSTRUMENTS are those which take the lowest parts of those played by their respective families. Thus the *bass clarinet* is the same as an ordinary

CLARINET, but speaks an octave lower; the *basset-horn* is a clarinet speaking a fifth lower; the *bass flute* is now obsolete, but it was played like a flageolet, and was an octave (or nearly) beneath the **FLUTE**; the *bass drum* is better known as the "big drum," and is sufficiently well expressed by its name; the *bass tuba* is the lowest of the saxhorn family, a sort of **BOMBARDON**, with the enormous compass of four octaves, beginning on **E₂F₂**, more than an octave below the bass staff, and giving the heaviest tone in the orchestra except the double bassoon [see **CONTRA-FAGOTTO**]; the *bassoon* is the chief bass instrument of the "wood wind" [see **BASSOON**]; and finally the *bass viol*, or simply "the bass," are familiar names for the **VIOLONCELLO**, which is the lowest of the string family in use in chamber music, just as the well-known *double bass* occupies the similar position in the orchestra. See **CONTRA-BASSO**.

BASS'S STRAIT, between Victoria, in Australia, and Tasmania, was first discovered by George Bass, the surgeon of a British man-of-war, while on a sealing expedition from Port Jackson in an open boat in 1798. The nearest approach of Australia and Tasmania is between Wilson's Promontory to the north, and Circular Head to the south, the distance between which is 105 miles. The greatest depth of water between these two points is about 270 feet, with a bottom composed of stones, sand, shells, and coral, but no deposit of mud. The prevailing winds are from the west. The tide rises from 8 to 12 feet. The strait is so thickly studded with islands and shoals as to render the navigation difficult. The islands abound in seals, sea-elephants, and other marine animals.

BASSAN'O. *Giacomo da Ponte*, commonly called *Bassano*, was born at Bassano in the year 1510. He was instructed in the elementary principles of his art by his father, and was afterwards sent to Venice. He applied himself with intense assiduity to the general study of the great artists of the Venetian school, and in all that relates to mechanical practice, with extraordinary success; nor are evidences wanting that even in grandeur of style and conception he exhibited at that time a capacity which none who judge him by his later works would suppose him to have possessed. Bassano also painted portraits, and several of the most distinguished persons in Venice sat to him during his residence in that city, among them Sebastiano Venezio, the doge, Tasso, and Ariosto. On the death of his father he returned to Bassano and took possession of his paternal residence, situated on the picturesque banks of the Brenta. He resided here during the remainder of his life. "Bassano," Sir Joshua Reynolds observes, "painted the boors of the district of Bassano, and called them patriarchs and prophets." But in spite of his defects, such is the spirit, clearness, and decision of his touch, the depth and richness of his tones, and the general picturesqueness of his effects, that his works not only commanded the respect of contemporary artists, but have been always valued by judges of painting for qualities so important in the art. Giacomo da Ponte had four sons who followed his profession. He died in 1592.

BASSAN'O, a city in the province of Vicenza, in Northern Italy. It is situated on the left bank of the Brenta, 15 miles north of Vicenza, in a district famous for its natural beauty and fertility. The town itself stands on an eminence at the base of the Carnic Alps. It is surrounded by old ivy-clad walls, and is joined to a suburb on the right bank of the river by a very handsome bridge, built by the architect Ferracina. Several of the churches of Bassano are decorated with paintings by Giacomo da Ponte and his son Francesco. Near the cathedral rises the once-fortified tower of Ezzelino, the cruel Ghibelin leader, which affords a lovely view. Bassano is a place of great trade; it has manufactures of silk, woollen cloths, straw hats, and tanneries, and one of the largest printing

offices in Italy. The population in 1862 was 14,524. The country around is hilly, covered with vines and olive-trees, and interspersed with villages. Bonaparte defeated the Austrians under Wurmser at Bassano, on 8th September, 1796, four days after the battle of Roveredo—having marched hither from Trent in two days. In 1809 he elevated the district into a duchy, and conferred it upon his secretary of state, Maret.

BASS-BAR, a bar of wood running along the under side of the "belly" of the violin, viola, violoncello, &c., in the direction of and directly underneath the bass string and the bass foot of the bridge. Its office is to resist the thrust of the bridge on this side, just as the sound-post resists it on the treble side. The rise in pitch, and the consequent greater strain upon instruments, at present as much as a third more than 150 years since, has caused stiffer bass-bars to be required; and it is almost impossible now to find a Cremona instrument (certainly impossible to find one in actual use) with the original bass-bar.

BASSE (Labrax) is a genus of fishes of the order ACANTHOPTERYGII, belonging to the same family as the PERCH, from which it differs in the tongue being covered with teeth, and the first dorsal fin having only nine spines. The basse is found on the coasts of Europe and America. The European species (*Labrax lupus*) is a voracious fish with a large stomach, and was much esteemed of old. By the ancient Greeks it was so highly valued that Archestratus calls a basse brought from Milet "offspring of the gods." It had replaced the sturgeon as highest in repute at feasts in the days of Augustus, and it was a matter of importance to ascertain the exact locality of the capture of a basse. At certain seasons the basse of rivers was most prized. According to Horace, the epicures of Rome could tell at a bite whether their *lupi* had been taken between the bridges over the Tiber or near the sea, "at the mouth of the Tuscany river." These were the younger fish, and were spotted. The finest were named *luati* (woolly), because their flesh rivalled wool in softness and whiteness. According to Columella, the cultivated taste of Marcus Philippus first taught the Romans to prize the basse that were taken while exhausting their strength in stemming the current of the Tiber.

The basse was supposed by the ancient writers to be very careful of its safety. Aristotle calls it the most cunning of fishes; and Ovid and Elian say that when inclosed by nets it will burrow in the sand, and allow them to pass over it. It will strike off a bait with its tail, or if caught by the hook it will twist about so as to widen the wound, and suffer the barb to come out. It received its ancient name of *Lupus* from its cunning, and that of *Labrax* from its voracity. The Striped Basse (*Labrax lineatus*) is the most common of the North American species.

BASSEIN, a district in the Pegu division of British Burmah, lying between 15° 44' and 17° 59' N. lat., and between 94° 15' and 95° 40' E. lon. The area is 6517 square miles, and the population 330,000.

The district is in shape an irregular parallelogram, extending northwards from the Bay of Bengal, and divided into two very unequal parts by the Aracan Hills. The western portion forms a narrow mountainous strip; the eastern is a stretch of alluvial land, traversed by three large branches of the Irrawaddi, which flow nearly parallel to one another into the sea. Of this tract the northern and largest portion, as far south as Ngaputaw, is well watered and very fertile; the southern portion consists of cultivated plains and large wastes of forest, gradually merging into low marshy ground, cut up into numerous islands by the network of tidal creeks uniting the mouths of the Irrawaddi.

The chief product is rice. Sesamum and tobacco are cultivated to a small extent. The produce of the district can easily be transported by the sea-water creeks, the

natural means of communication, which also irrigate and fertilize the country.

The climate of Bassein is relaxing, owing to the situation of the district in the delta of the Irrawaddi, with the country around intersected by tidal creeks, the muddy banks of which are exposed during the greater part of the day. The rainfall sometimes exceeds 100 inches per annum. Cholera and fever are endemic, whilst bowel complaints, dropsy, and rheumatism are common.

BASSEIN, the headquarters, station, and chief port of Bassein district, is situated in the delta of the Irrawaddi, on both banks of the Bassein river. The population is 24,000. The port has rapidly progressed under British rule. Rice forms the chief article of export, and is mainly sent to Europe. Small quantities of timber, cotton, tobacco, and oil seeds are also exported. The chief imports are coal, salt, piece-goods, cotton stuffs, and crockery. Chinese junks bring small consignments of tea and silk, mainly for the use of the Chinese community. Native craft from the coast of Madras bring coco-nuts and other articles used by the Malaysians, who are employed largely in loading and unloading ships.

Bassein was utterly depopulated in the time of Alomg-blura (Alompra), and no trustworthy records of its early history exist. From the natural advantages of its site, it has always been a harbour of considerable importance, and is alluded to as "Cosmen," by Ralph Fitch and other travellers, who found Rangoon a small village. During the first Burmese war the occupation of the town by the British was unopposed, the Burmese governor having set fire to it and retreated. The population gradually returned, and the place was not abandoned till the conclusion of war, when the troops were withdrawn. During the second Burmese war, in 1852, Bassein was finally taken by assault.

BASSEIN, an island off the coast of the Konkan, in the Bombay Presidency, is separated by a narrow channel from the mainland. It lies between 19° 20' and 19° 28' N. lat., and between 72° 48' and 72° 54' E. lon., being about 11 miles in length from south-east to north-west, and 3 in breadth. The area is 35 square miles. With the exception of two rugged hills of considerable size, the surface of the island is flat and its soil rich, yielding crops of rice, plantain, sugar-cane, and *pau* (piper betel).

BASSEIN (Wasai), the chief town of the subdivision of the same name in Tanna district, Bombay, about 5 miles from the Bassein Road station on the Bombay, Baroda, and Central India Railway, and 28 miles north of Bombay. The population is about 10,000. Bassein early attracted the notice of the Portuguese, as the river or strait separating the island from the mainland was a convenient rendezvous for shipping. In 1534 Bassein, with the land in its neighbourhood, was ceded to them by Bahadur Shah, king of Guzerat, and two years later the fort was built. For more than two centuries Bassein remained in the hands of the Portuguese, and during this time it advanced to such prosperity that the city came to be called the Court of the North, and its nobles were proverbial for their wealth and magnificence. With plentiful supplies of both timber and stone, Bassein was adorned with many noble buildings, including a cathedral, five convents, thirteen churches, and an asylum for orphans. The dwellings of the hidalgos, or aristocracy, who alone were allowed to live within the city walls, are described (1675) as stately buildings, two stories high, graced with covered balconies and large windows. Towards the end of the seventeenth century Bassein suffered severely from outbreaks of the plague, so deadly that in 1695 one-third of the population was swept away. In spite of the general decay of Portuguese power in the seventeenth century, Bassein, as late as 1720, would seem to have retained much of its prosperity. In that year the population was returned at 60,000. But the wealth of one city was

unable to stay the advance of Marhatta power. In 1739 Chinnaji Appa, a distinguished Marhatta general, at the head of a powerful army, appeared before Bassein. After a siege of three months, conducted on both sides with the greatest skill and courage, the garrison was forced to capitulate, and the town and district of Bassein passed into the hands of the Peshwa. Under the Marhattas Bassein became the chief place in their territories between the Bankot river and Damau; but they did not long keep possession of the city. In 1780, after a siege of twelve days, it was captured by a British army, under General Goddard. By the treaty of Salbai (1782) it was restored to the Marhattas; and in 1818, on the overthrow and deposition of the last of the Peshwas, it was resumed by the English, and incorporated with the Tanna district of the Bombay Presidency.

Of old Bassein the walls and ramparts remain in a state of good preservation. Within the inclosure the ruins of the cathedral, of the Dominican convent, of the Jesuit Church of St. Paul, and of St. Anthony's Church, built as early as 1537, can still be identified. At Bassein was concluded, in 1802, the important treaty by which the Peshwa agreed to maintain a British subsidiary force, thus virtually dissolving the Marhatta confederacy.

BASSES PYRÉNÉES. See PYRÉNÉES, BASSES.

BAS' SET-HORN. See CONINO DI BASSETTO.

BAS'SIA is a genus of tropical plants, belonging to the order SAPOTACEÆ. The species are found in the East Indies and in Africa, where they are of great economical importance on account of the abundance of a sweet buttery substance which is yielded by their seeds when boiled. The whitish fleshy corolla is divided above into eight lobes; the stamens are numerous; and the ovary, with six to eight cells, becomes a pulpy fruit with three or four one-seeded cells.

Bassia butyracea (the Indian butter-tree) is found wild on the Ahnora Hills in India, where it grows to a considerable size, its trunk sometimes measuring 50 feet in height, and 5 or 6 feet in circumference. From the seeds is produced a fat-like substance, a kind of vegetable butter which is used for rheumatism, and also in the manufacture of soap. The pulp of the fruit is eatable, and the juice of the flowers is made into sugar.

Bassia longifolia (the Indian oil-tree) is a large tree a good deal like the last, but its leaves are narrower and its flowers much more fleshy. It is a native of the peninsula of India, and is found in plantations along the southern coast of Coromandel. Its fruit is yellowish, and yields by pressure a valuable oil, which is used by the poorer natives of India for their lamps, for soap, and instead of better oil for cookery. The flowers also are roasted and eaten by the Indian peasants, or bruised and boiled to a jelly and made into small balls, which are sold or exchanged for fish, rice, and various sorts of small grain. The wood is as hard and durable as teak, so that this is one of the most generally useful trees found on the continent of India.

Bassia latifolia (the mahwal) has oblong leaves, and the corolla has a very protuberant tube. It is a native of the mountainous parts of the Circars and of Bengal, where it forms a middling-sized tree. Its wood is hard and strong, and proper for the axes of wheels. The flowers are eaten by the natives; they also yield by distillation a strong intoxicating spirit. From their seeds a considerable quantity of greenish-yellow oil is obtained, which is found useful for the supply of lamps; it is, however, inferior to that of the last species. It is curious that this oil stains linen or woollen cloth as animal oil does, while the fatty substance of the *Bassia butyracea* possesses no such property, but when rubbed on cloth leaves no trace behind.

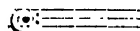
A fourth species is *Bassia Parkii* (the shea-tree or African butter plant), which is so important an article of African internal commerce. This plant was frequently spoken of by Park in his "Travels in Africa."

BASSIGNY, a district in the former province of Champagne, in France, now forms the arrondissements of Chaumont and Langres in the department of Haute Marne, the canton of Gondrecourt in the department of Meuse, and a small portion of the arrondissement of Bar-sur-Aube in the department of Aube. Its chief towns were Langres, Chaumont, and Bourbon-les-Bains.

BASSOON, a well-known orchestral instrument, forming the bass of the "wood wind." [See INSTRUMENTATION and ORCHESTRA.] It may be considered as a bass oboe, which it resembles in being played with a double reed [see REED INSTRUMENTS]; and it is one of the most effective and important instruments in the whole orchestra. There seems reason to claim an eastern origin for the bassoon, and to regard it as a development of the drone of the BAGPIPE. This is the more likely from the Egyptian word for bagpipe, *zummarah bi soan*, the last syllables of which closely correspond with the mediæval name of the instrument, *buzaine*. Its Italian name *fagotto* (whence the German *fagott*) is derived from its resemblance to a faggot or bundle of sticks.

Its almost fortuitous origin stamps the bassoon with a peculiarity not yet overcome. It has grown up from a country bass-pipe into an orchestral instrument of great beauty, by modifications as gradual and slight as those which converted the crwth into a violin; each maker has added some touch of his own individuality, and none has yet succeeded in bringing its capricious scale into regularity. Recent attempts at this have only succeeded at the expense of more important characteristics, and the bassoon is the sole instrument, except the violin family, of which the older instruments are the most esteemed for quality of tone.

The instrument is in five pieces, the crook (carrying the mouth-piece, and projecting sideways from the main pipe), wing, butt, long joint and bell, forming together a tube of conical bore 93 inches long, and giving the note BB♭.



From the crook, about 12 inches long, the tube proceeds through the wing down to the bottom of the butt, about 32 inches more in all, then turns sharply on itself, ascending again within the butt, through the long joint (which is fastened to the wing by the wooden "flap," which gives the latter its name) up to the bell, 49 inches in all. The latter, therefore, is the total height of the instrument in appearance. This arrangement of the pipe renders the holes able to be brought conveniently within reach of the fingers, and accordingly the left hand, held about breast high, finds finger-holes in the wing, and the right hand, held about level with the middle of the right thigh, governs the holes in the butt joint. The bassoon itself is supported skantwise across the body, partly by the hands and partly by a strap passing round the performer's neck.

The lowest note of the bassoon (BB♭) is two semitones below that of the violoncello (C), and Wagner ("Ring der Nibelungen") has written for even a semitone below this (AA), but few other composers venture to imitate him. The compass is very extensive, reaching through three entire octaves up to *b*,² in the middle of the treble stave, and giving semitones all the way in the hands of an accomplished performer. Ordinary players find some notes very difficult, however; and owing to the individuality of the bassoon hardly two instruments are alike, so that the best players cannot play upon an unfamiliar instrument. The notes are the consecutive partial tones of an open pipe [see PARTIAL TONES], but the same note can often be produced by two different fingerings, and sometimes by three, or in a few cases by four, in each case with slight differences of pitch and quality, so that a fine performer is guided very much by his ear. In this particular also the

bassoon approximates to the violin family more nearly than any other member of the orchestra. The bassoon part is generally written on the bass staff, but the upper parts (as with the violoncello) are written on the tenor staff. Its fingering somewhat resembles that of the oboe, and the keys with not more than three sharps or flats in the signature are the easiest.

No other wind instrument has so much variety as the bassoon. In the upper octave its tone is full of expression, resembling very nearly the violoncello as a solo instrument, and still more nearly a tenor voice. On the other hand, of the notes in the middle octave, the great master of instrumentation, Berlioz, in his celebrated treatise on the subject, thus speaks:—"When M. Meyerbeer, in his resurrection of the muns (Robert the Devil), wished to find a pale, cold, cadaverous sound, he obtained it from the weak middle notes of the bassoon." Prout ("Instrumentation," London, 1880) points out that Handel had "done precisely the same thing a century before in the scene between Saul and the Witch of Endor" (Handel's "Saul"). Further, the grotesque effects of the bassoon, especially of the low notes, and most of all when played staccato, have gained it the title of the "clown of the orchestra." Few can remain unmoved to smiles when the exquisitely funny "Clown's March," in Mendelssohn's "Midsummer Night's Dream" music, is played, and of this the bassoon gives more than half the humor. The similar use of the instrument by Beethoven, in the "Pastoral Symphony," is believed to be an idealization of an actual performance by a drunken itinerant musician; however that may be, it is unrivalled for its humorous effect. Haydn also was very fond of bassoon fun, in his genial humorous way. Weber and Wagner are great masters rather of its more serious effects. As a general orchestral instrument, apart from solo effects, the bassoon gives the bass to the flute, oboe, and clarinet in combination, used as a contrast to the rest of the orchestra; or in "tutti" passages it reinforces the violoncello and the other bass instruments. Frequently the two bassoons unite with two horns to play a separate passage, and this Proteus of instruments blends so perfectly if well played, that the effect of four horns is imitated. The wonderfully beautiful opening to Schubert's Symphony in B minor (unfinished) is only one of countless cases in point. It is evident, therefore, that the assertion made above as to the unrivalled variety and usefulness of the bassoon amongst the wind instruments of the orchestra has been well borne out by fact.

BASSOON, DOUBLE. See CONTRA-FAGOTTO.

BASSO'RA. See BUSSORAH.

BAS'SO-RILIE'VO. See BAS RELIEF.

BAST. In flowering and the higher flowerless plants fibrous strings may be noticed running through the stem, and uniting in older portions of dicotyledons to form a ring. These fibrous strings, called in botany fibro-vascular bundles, are composed of two parts, the woody portion and the bast, separated by the formative tissue (CAMBIUM).

The bast portion consists of thin-walled cubical cells (parenchyma) and long cells forming tubes, as well as of the true bast long fibres with thin walls greatly thickened, tough, and flexible. These elements may occur singly or together, in various intermixture, sometimes irregularly, at others in alternate layers.

The bast employed by gardeners for tying plants is obtained from the lime tree (*Tilia*). Cuba bast, used for the same purpose and for tying bundles of cigars, is from the West Indian tree, the Mountain Mahoe (*Paritium elatum*).

BAST'ARD, an illegitimate child. The word comes from the old French *bastard*, i.e. *fils de bast* (pack-saddle), "son of a pack-saddle," not of a bed. Among old English writers it is applied to a child not born in lawful wedlock; and as such he is technically distinguished from a *mulier* (*filius mulieratus*), who is the legitimate offspring of a

mulier, or married woman. The term *natural* is also applied to all children born out of wedlock.

By the older English law, a child born during the marriage of his parents is legitimate, even if the child is begotten out of matrimony. Hence it was a maxim that nothing but physical or natural impossibility, such as the continued absence of the husband beyond seas, &c., could justify an inquiry into the real paternity. At the present time, however, the fact of birth during marriage, or within a certain time after the husband's death, gives only a strong presumption of legitimacy, which is capable of being repelled by satisfactory evidence.

An illegitimate child is regarded, for most purposes, as the son of nobody, and is therefore heir-at-law to none of his reputed ancestors. He has no father, mother, sister, nor brother, legally. He is entitled to no distributive share of the personal property of his parents if they die intestate; and under a will he cannot take under the general description of "son," "daughter," or "child," by which legitimate children alone are presumed to be designated. But he can take under a will made even before he is born, if he is particularly described. He may acquire property himself, and thus become the founder of a fresh family and a fresh inheritance, though none of his lineal descendants can claim through him the property of his reputed kin. If he dies without wife, issue, or will, his lands and goods escheat to the crown, or lord of the fee. In the former event, it is usual for the crown to resign its claim to the greater part of the property on the petition of some of his nearest *quasi* kindred. A bastard has no surname until he has acquired one by reputation, and in the meantime he is properly called by that of his mother, and she is entitled to the custody of the child.

The first English statute which provides for the maintenance of illegitimate children is the 18 Eliz. c. 3, which conferred on justices of the peace the power of requiring, from one or both of the parents a weekly or other payment for their support, and in default thereof, of committing them to gaol until they found surety to make such payment, or else to appear at the next quarter sessions to abide the order of the justices. The law on the subject of bastard children has undergone many changes, which shows that no settled principle has regulated our legislation on this subject. Under the Act of Elizabeth and later Acts of Parliament, down to the passing of the Poor Law Amendment Act in 1834, the usual practice was for the mother to apply for relief to the parish officers of her own parish, by whom she was carried before the magistrates to be interrogated respecting the paternity of the child. An order of affiliation was then made, and the reputed father was ordered to contribute a weekly payment, or was bound to indemnify the parish against the future expenses of maintenance. By the 7 & 8 Vict. c. 101, the officers of all parishes and unions were deprived of the power, which they had before, of applying for orders of affiliation with regard to illegitimate children born before or after the passing of the Act, and the mother alone was entitled to apply for such order; but in case of the death or incapacity of the mother the guardians might enforce an order, although they could not apply for one; and payments were to be made to some person appointed by the justices to have the custody of the child, and not to the parish officers. Payments on account of bastard children are now regulated by the Bastardy Laws Amendment Act, 1872 (35 & 36 Vict. c. 65), and by the 36 & 37 Vict. c. 9, passed in 1873, by which it was amended. Under these Acts the mother of a bastard may summon the putative father before the petty sessions within twelve months after the birth of the child, or at any time on proof of money having been paid to her within twelve months of the child's birth in respect of such child. The justices may then make an order on the putative father for the maintenance and education of

the child, not exceeding 5s. per week, and for the expenses of birth, or of the funeral of the child should it have died. The sum paid for maintenance is to be paid to the mother, and if she neglect or desert her offspring she may be punished under the Vagrant Act. Her liability while unmarried continues until the child is sixteen. Should a bastard child become chargeable to the poor-law guardians, they may recover payment to the relieving officer. All orders for the maintenance of a bastard cease after it has attained the age of thirteen, unless the justices specially order payments to continue till the child is sixteen. Orders cease upon the death of the child, but since 1872 they are unaffected by the subsequent marriage of the mother.

In *Scotland* the law of bastardy differs considerably from the English, chiefly because of much of the Roman and pontifical doctrines of marriage and legitimacy having been adopted.

The Scottish law has adopted two species of legitimization, which, in the language of the civil law, they call legitimization *per subsequens matrimonium*, and legitimization *per rescriptum principis*.

The former of these was introduced by the Emperor Constantine the Great for a temporary purpose, but it afterwards became a regular form of legitimization for children born in concubinage. The doctrine of legitimization was certainly no part of the ancient common law of Scotland any more than of England; but it is now settled law there, and its rise and establishment are accounted for when we consider the former paramount influence of the canon and civil laws in that country. The principle on which the doctrine rests is the fiction that the parents were married at their child's birth. If, therefore, the parents could not have then legally married, or if a mid impediment has intervened between the birth and the intermarriage, the fiction is excluded, and previous issue will not be legitimated by marriage. Further, it is held that if the child was born, or if the intermarriage took place, in a country which does not acknowledge the doctrine of legitimization by subsequent marriage, the child will remain a bastard. A child legitimated *per subsequens matrimonium* is entitled to all the rights of lawful issue, and will, as respects inheritance and the like, take precedence of subsequent issue born in actual wedlock; yet in England the judges have held that a child born in Scotland before marriage, and legitimated in Scotland by subsequent marriage, the parents also being domiciled there, though in point of fact the first-born son, and in status and condition, by comity, legitimate in England, cannot succeed as heir to land in England, and the opinion of the judges was confirmed by the House of Lords.

Legitimation *per rescriptum principis* ("by the prince's letters") was established by Justinian. The form of these letters seems to have been borrowed by the Scots immediately out of the old French jurisprudence; their clauses are usually very ample, capacitating the grantee for all honours and offices whatsoever, and to do all acts in judgment or outwith, and, in short, imparting to him all the public rights of lawful children and natural-born subjects, together with a cession of the crown's rights by reason of bastardy; but as the crown cannot affect the rights of third persons without their consent, letters of legitimization do not carry a right of inheritance to the prejudice of lawful issue.

By 6 Will. IV. c. 22, the only remaining incapacity in Scotland—the want of power to make a testament in the particular case of the bastard having no lawful issue—was done away with. Letters of legitimization were formerly necessary in all cases; but it was held that, as the crown's right of succession was excluded by the existence of issue, a bastard who had lawful issue might dispose of his goods by testament in any way he thought fit. Since the passing of 6 Will. IV. c. 22, there is now no distinction between a

bastard and another man as to the power of disposing of his property; and he may succeed to any estate, real or personal, by special designation. To his lawful children, also, he may appoint testamentary guardians; and his widow has her provisions like other relict's. But as a bastard is *nullius filius*, and of kin to nobody, he cannot be heir-at-law to any one, neither can he have such heirs save his own lawful issue. If a bastard die leaving no heir, the crown takes his property.

But the Scottish law takes notice of the natural relationship of bastards for several purposes, and particularly to enforce the natural duties of their parents. These duties are comprised under the term *aliment*, and comprehend both maintenance and education. In determining who is the father of a bastard, the Scots courts again proceed on the principles of the civil law. In Scotland there must first be semiplenary evidence of the paternity, and then, when such circumstantial or other proof of that fact is adduced as will amount to such evidence, the mother is admitted to her oath in supplement. The whole aliment is not due from one parent, but from both parents; and therefore, in determining what shall be payable by the father, the ability of the mother to contribute is also considered. The absolute amount of aliment, however, is in the discretion of the court, as is likewise its duration. Where the parties are paupers, the bastard's settlement is not the father's, but the mother's parish, and if that is unknown, the parish of its birth. The mother of a bastard is entitled to its custody during its infancy.

The following are the most recent statistics relating to illegitimacy. It should be stated that many of the children registered as illegitimate in Scotland are afterwards legitimized by the marriage of the parents:—

	Percentage of Illegitimate Births.		Percentage of Illegitimate Births.
England and Wales, . . .	5.9	Sweden, . . .	9.5
Scotland, . . .	10.1	Austria, . . .	10.9
Ireland, . . .	2.3	Wurtemberg, . . .	16.4
Spain, . . .	5.5	Bavaria, . . .	22.5
Italy, . . .	5.1	Vienna (city), . . .	51.5
Holland, . . .	4.1	Paris " . . .	28.1
Belgium, . . .	7.0	Berlin " . . .	15.9
France, . . .	7.5	Edinburgh, . . .	9.2
Prussia, . . .	8.1	London, . . .	4.1
Norway, . . .	8.4		

BASTARDS or **PIECES**, in sugar-refining, impure or damaged sugar, resulting from the heat and chemicals used in the process of manufacture, and which will not pay for purifying.

BASTI, a British district of the Benares division, in the Lieutenant-governorship of the North-western Provinces and Oudh, lying between 26° 24' and 27° 30' N. lat., and between 82° 17' and 83° 20' E. lon. The area is 2789 square miles, and the population 1,500,000.

Basti is a submontane tract lying between the Nepal Hills and the Gogra (Ghagra) river, and presents a flat marshy aspect. The territory of Nepal bounds it on the north, Oudh on the south and west, and Gorakhpur district of the North-western Provinces on the east. It has a mean height of only 326 feet above sea-level, and no natural elevations of any description diversify its surface. Numerous rivers and lakes keep the soil charged with moisture; and in the rainy season every depression fills, forming a temporary lake, till dried up by the sun.

The area of Basti is almost entirely under cultivation. In the north the great expanse of alluvial land, still in parts submerged for half the year, grows rice luxuriantly, and over the rest of the district all the cereals common to the North-western Provinces are cultivated.

The district is on the whole an unhealthy one, for the

excessive atmospheric humidity and the defective drainage combine to make fevers prevalent.

BASTIA, the most populous town in Corsica, is situated on the eastern coast of the island. Its port is formed by a little creek, which is defended by a mole 161 yards long, running north and south. The entrance to the harbour is only 76 yards wide between the extremity of the mole and a singular rock which has very much the appearance of a lion in repose, and is called "Il Leone." At the end of the mole, and on the right of the mouth of the harbour, there is a fixed light 52½ feet high, which can be seen at a distance of 10 miles. The town occupies a very picturesque situation, rising from the sea in the form of an amphitheatre. It is fortified with walls and bastions, and it has large suburbs outside the fortifications. The view from Bastia over the sea is very fine. It embraces the islands of Elba, Capraia, and Monte Cristo, and the distant coast of Tuscany. The streets of Bastia are narrow, and the houses lofty and built after the Italian fashion. The High Court for the whole island sits at Bastia. The town also has a college, tribunals of first instance and of commerce, and a public library. There is also an hospital, the foundation stone of which was laid by the then Empress of the French while on a visit to the island with the Prince Imperial in 1869. The principal churches are the cathedral, and the Churches of St. John the Baptist, St. Roch, and of the Conception. Shoe and glove leather, soap, wax candles, and liquors are the principal manufactures. The exports consist of wine, oil, coral, and other products. It is the principal seat of commerce in the island. Fishing gives employment to a large part of the population. Bastia is 95 miles east by south from Toulon, and 56 from Piombino on the coast of Tuscany. Steamers ply regularly every week between Bastia and Marseilles. The population in 1883 was 18,500.

BASTIAT, FRÉDÉRIC, an illustrious political economist and author, was the son of a merchant of Bayonne, in which town he was born on the 19th June, 1801. He was educated for the profession of his father, and at the age of seventeen he entered the commercial house of one of his uncles at Bayonne. He employed his leisure in the study of political economy, and in 1825, becoming possessed of an estate at Mugron, he retired from business in order that he might devote himself to that science. In 1842 he commenced to study the principles advocated by the English Anti-Corn-Law League in favour of free trade, and in 1844 he published in the *Journal des Économistes* an article on the "Influence of the French and English Tariffs." In 1840 he travelled in Spain and Portugal, and in 1845 he visited England, where he became acquainted with Cobden, Bright, and the other leaders of the league, and on his return he translated and published a selection of their speeches, with an introductory preface. It was his aim to carry out in France a similar movement in favour of free trade to that which he had witnessed in England, and he became secretary to the central committee of the free-trade societies, and editor of a weekly journal devoted to the advocacy of its principles. He also contributed to the *Journal des Économistes*, and by his lectures and speeches endeavoured to bring over his countrymen to his views. After the revolution of 1848 he was elected a member of the Constituent Assembly, and by his voice and pen vigorously assailed the socialist theories advocated by Louis Blanc, Proudhon, and others. In 1850 he published the first volume of what he intended to be his greatest work, "*Les Harmonies Économiques*," but in the autumn of that year he suffered so greatly from pulmonary disease that he retired to Italy in the hopes of receiving benefit from the change of climate. His hopes were not realized, and after a lingering illness he died at Rome on the 24th December, 1850, in the fiftieth year of his age.

In addition to the works mentioned, he was the author

of "*Sophismes Économiques*" (1846), "*Propriété et Loi*," "*Justice et Fraternité*" (1848), "*Protectionisme et Communisme*" (1849), "*Capital et Rente*," "*Spoliation et Loi*," "*Gratuité du Credit*," and numerous other pamphlets and essays bearing on similar subjects. In all his writings he gives evidence of an extensive knowledge of the principles of political economy; his arguments are clear and convincing, and his style is epigrammatic and interesting. The second edition of his complete works, in seven vols., appeared in 1865. His "*Harmonies Économiques*" was translated into English by Dr. P. J. Stirling (London, 1860), under the title of "*Harmonies of Political Economy*." The doctrines of Bastiat slowly but steadily increase in favour with his countrymen.

BASTILLE, the name used in France to denote a fortress or state prison (the word is connected with *bastion*). There have been three of that name at Paris—the Bastille du Temple, the Bastille of St. Denis, and that of the Rue St. Antoine. It is the last which has obtained historical celebrity, and is usually denominated The Bastille. This fortress stood at the east end of Paris, on the north side of the Seine. It was originally intended for the protection of the city, but afterwards was used as a state prison, Hugues d'Aubriot, prévost des marchands in the reign of Charles V., laid the first stone on the 22nd of April, 1369, by the order of that king. The Bastille consisted at first of two round towers, with an entrance between them. Afterwards, to render it stronger, two additional towers, parallel to the two first, were built, and the whole connected by walls. The building, however, was not completed till 1383, in the reign of Charles VI., when four more towers were added, of the same dimensions, and at equal distances from the first four, and the whole eight were united by masonry of great thickness, in which were constructed a great number of apartments and offices. The entrance to the city by the original gate was closed, and the road carried without the building. In 1634 a fosse, 120 feet wide and 25 feet deep, was dug all round; and beyond that a stone wall, 36 feet high, was built all round. Thus the Bastille became, from a fortified gate, one of the strongest fortresses of the kind in Europe. The towers contained several octagonal rooms, one above the other, secured with double doors, and without fire-places, each having one window pierced in the walls, which were rather more than 6 feet thick, unglazed, and with iron gratings. The only article of furniture, if it may be so called, was an iron grating, raised about 6 inches from the floor, to receive the prisoner's mattress, and prevent its decay from the damp of the stone floor. To each tower there was a way by a narrow winding staircase. The apartments constructed in the walls which connected the towers were larger and more commodious than the others, and were provided with fire-places and chimneys, but with similar precautions for preventing the escape of prisoners. The rest of the Bastille consisted of two open courts—the larger, 108 feet by 77 feet, called the Great Court; the smaller, 77 feet by 45 feet, called the Court of the Well, was separated from the first by a range of buildings and offices, having a passage through them. The height of the building within was 78 feet, but greater on the outside next the fosse.

This prison was used for the confinement of persons considered dangerous by the government, who exercised their power in the most despotic manner. In general the treatment seems to have been very severe. The only prisoners who ever effected their escape from the Bastille were two persons of the name of Latude and D'Aligre, the narrative of which, published by Latude, is extremely interesting. Of all the prisoners in the Bastille none have excited curiosity so strongly as the still unknown person usually called the Man with the Iron Mask.

The Bastille was besieged and taken three times—in 1418, by the Burgundians; in 1594, by Henry IV.; and

on the 14th of July, 1789, by the Parisians, from which day the French Revolution may be dated. On the latter most memorable occasion the garrison consisted of eighty-two old "Invalides," reinforced by thirty-two young soldiers of the Swiss Guard, and there was but one day's provision. The governor, De Launay, was asked for arms by deputation after deputation of the newly formed National Guard, which he refused, answering through closed gates, according to royal orders. The mob began to gather towards noon, and some shots were fired at the sentries. The drawbridge being lowered to let out a certain elector, Thuriot, who had been advising surrender, a number of citizens rushed in and refused to quit the outer court, whereupon De Launay drew up the drawbridge, making these prisoners, and fired on the mob outside. But those within the gates mounted, on bayonets stuck into the wall, to where the chains could be reached, and a cartwright named Louis Tournay (an old soldier, too) cut asunder the chains with an axe amid a hail of fire from the garrison. The drawbridge fell, and the mob, now in full insurrection, filled the outer court; cannon (one a state-present of the King of Siam) were procured, and volunteer gunners were freely forthcoming, many being old soldiers. Firemen came too, and tried to drench the garrison to render their weapons useless; but the force of their pumps was insufficient. Straw fires were lit ineffectually to smoke out the garrison; even women joined in the firing. Now and then a deputation with a flag of truce arrived from the town-hall, quietly ignored always by De Launay. So things went on from one till five o'clock. Then the Swiss Guard at the gate offered to surrender if immunity were granted to all; and being answered favourably, "on the faith of an officer," by one of the gentlemen directing the mob (an ex-soldier), they lowered the inner drawbridge, and the Bastille had fallen. The "faith of an officer" was powerless to restrain the mob from murdering poor De Launay and several more of the garrison; the rest were saved by the *Gaides Françaises* with difficulty. All during the day the Baron de Besenval lay with a small but choice body of troops on the other side of Paris, but no orders from the court reached him in response to his appeals, and at dusk he marched to Versailles. The king, kept in ignorance of what had occurred, was informed of it late at night by the Duke de Liancourt. "Why, it's a revolt," said poor Louis XVI. "Sire," answered De Liancourt, in a phrase which has become historical, "It is not a revolt, it is a revolution."

Seven prisoners were found in the Bastille, and were carried in procession through Paris, with seven heads on pikes to match their number, and the keys of the fortress borne aloft. These keys were sent to George Washington by the city of Paris, and the Bastille itself was demolished. Day after day, and even month after month, "patriots" worked at overthrowing the huge structure; and when all was done Paris danced on the site, round a huge "tree of liberty" 60 feet high—one call being left in a corner of the place as a reminiscence. Its site is marked by a column in the *Place de la Bastille*.

It may be useful to remark, as this incident is so memorable, that the actual slaughter during the siege was trifling; eighty-three fell amongst the mob, and only one soldier of the garrison. (Dusaul's "Taking of the Bastille," Besenval's *Memoirs*, Linguet's "Bastille Dévoilée," Besenval's *Memoirs*, among the principal contemporary authorities. Carlyle's "French Revolution" gives the finest modern account in English.)

In 1880 the 14th of July was decreed the national feast (*Fête Nationale*), and is celebrated with illuminations, fireworks, public dancing, open theatres, &c.

BASTINA'DO is derived from the Spanish *bastonada*, a beating (*baston*, a stick). This excessively painful punishment is usually inflicted as follows:—Two men support between them a strong pole, which is kept in a horizontal position; about the middle of the pole are some cords with

two running knots or nooses; through these the naked feet are forced, and then made tight in such a manner that the soles are fairly exposed. The sufferer is then thrown on his back, or left to rest on his neck and shoulders with his feet inverted, which are forthwith beaten by a third man with a heavy tough stick. When the presiding officer or magistrate gives the word, the heavy blows cease, the maimed feet are cast loose from the cords and pole, and the victim is left to crawl away and cure himself as best he can.

According to the letter of the penal code of the Ottoman empire, this punishment can only be inflicted on the men of the fourth and last class of society, which comprises the slaves and the rayahs or tributary subjects of the empire, as Jews, Armenians, Greeks, &c. The other three classes—viz. (1) the emirs, or issue of the race of the prophet Mohammed, and the ulemas, or men of the law; (2) public functionaries, civil and military; and (3) free citizens, and private individuals who live on their rents or the proceeds of their industry, were all exempted by law from this cruel and degrading punishment. By the original code the number of blows to be given was from three to thirty-nine, but a later clause permitted them in certain cases to be carried to seventy-five; but in practice this is often exceeded, nor are the privileges always respected.

BASTION. This term is applied to a species of tower which constitutes the principal member of the fortifications immediately surrounding a town or position to be defended. The rampart by which it is formed is disposed on four sides of a pentagon, two of which, called the *faces*, meet in an angle whose vertex projects towards the country; the other two, denominated the *flanks*, connect the opposite extremities of the faces with the *curtain*, or that part of the rampart which coincides in direction with the sides of a polygon supposed to inclose the town. The fifth (inner) side of the pentagon is generally unoccupied by a rampart, and is called the *gorge* of the bastion.

From the accounts given by ancient writers of their fortified places, and particularly from the precept of Vitruvius ("Architectura," lib. i. c. 5), we learn that the projecting towers, which were always small, were sometimes square or polygonal, but generally circular, and that their distance from each other along the walls was regulated by the range of the weapons employed in the defence. The invention of artillery rendered it necessary to enlarge the towers for the purpose of receiving the guns, and to increase the thickness of the rampart that it might be able as well to resist the concussion produced by the discharge of its own ordnance as the shock of the enemy's artillery when fired against it. The ramparts were therefore constructed of earth, a revêtement of brick or stone, of a height which was supposed to be great enough to render it impossible for the enemy to mount it by scaling ladders, being built against it on the exterior.

In the cut the line *A B* represents one side of the polygon supposed to inclose the town fortified. The semicircular work at *A* (fig. 1) is half a round tower, and *A C* is part of the curtain or connecting wall between two such towers, according to the ancient manner of fortifying places; *a c* represents a sort of *fausse braye*, or elevation of earth protecting the ancient walls of a place. Fig. 2 represents half a bastion constructed at the angle *A*, of the curtain, according to the method of the first Italian and French engineers.

Fig. 3 represents a bastion as it is now usually constructed; the ramparts immediately above *f* and *g* are the flanks; these which unite below *E* are the faces, and an imaginary line from *f* to *g* is the gorge. The rampart to the left of *f* is the curtain joining the left flank of one bastion to the right flank of the next. The bastion is divided into two parts by the line *E B*, for the purpose of showing two methods of forming the interior; the left half has the space within the rampart of the face and flank on a level

with the natural ground, and the right half has the interior about 10 feet higher than the ground. The second method is that which is generally preferred, because it affords some facilities for the formation and defence of interior parapets or retrenchments.

In order to obtain a powerful fire for the defence of the main ditch, engineers were induced at one time to form the bastion with a double, and even a triple flank on each side, the flanks receding from each other, from below upwards, in the manner of terraces, towards the interior of the bastion, as at *e*, fig. 2; and, to prevent the enemy from dismounting the guns in the lower flanks by batteries

raised in the prolongations of those flanks, it became necessary to mask them by extending the rampart of the face beyond them, and giving it a return towards the curtain; this return was frequently rectilinear, but generally in the form of an arc of a circle, like a portion of a round tower, as at *m*, and the projection received the name of *orec'hione* or *orillon*. Besides masking the lower flanks from the effect of any enfilading or lateral fire, it concealed one or more guns on the upper flank from the fire of an enemy's battery directly opposed to that flank, while it permitted those guns to defend the main ditch and the breach made by the enemy in face of the collateral bastion. Eventually, how-

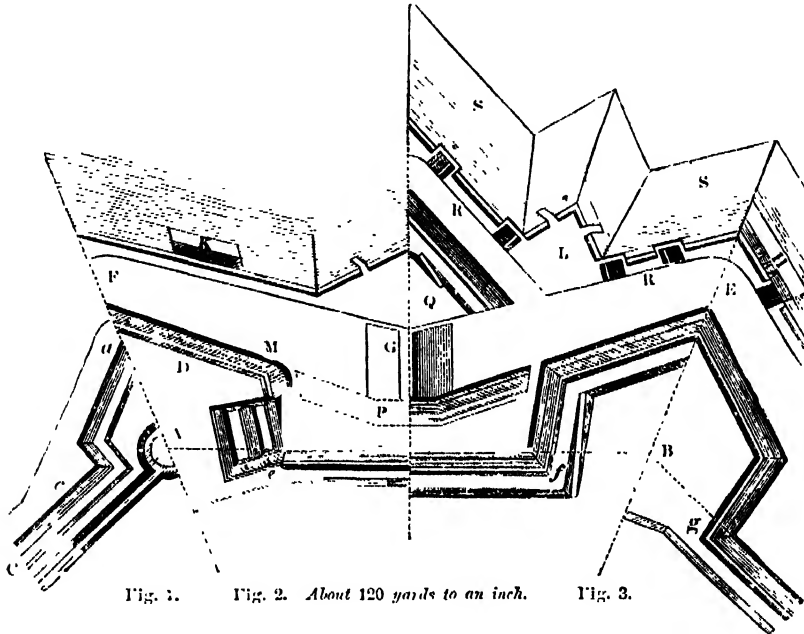


Fig. 1.

Fig. 2. About 120 yards to an inch.

Fig. 3.

ever, lower flanks ceased to be constructed, because they contracted too much the interior of the bastion to which they belonged, and because the enemy's fire, soon destroying the parapets of those above, masses of brickwork fell among the defenders below, and obliged them to quit their guns at the very time that their service was most required. The *orillons*, moreover, are now considered useless, as they contract the length of the flank; and the guns which they protect from a fire in their front are liable to be dismounted by a fire from their rear.

In what are called the second and third systems of Vauban the principal bastions are detached from the *enceinte* by a ditch in their rear, and consequently the capture of those works would not immediately compel the surrender of the fortress. In these systems a small bastion of brickwork, closed by a parapet wall at its gorge, is constructed at each of the angles formed by the polygonal wall surrounding the place. The fire from the parapets of these tower bastions, as they are called, would have a powerful effect in preventing the enemy, after he has breached and stormed the great bastions, from erecting batteries in them to destroy the interior walls; and in order to preserve the artillery of their flanks uninjured till the end of the siege, engineers placed it in *CASEMATES* from whence it might pour a destructive fire upon the assailants when crossing the ditch of the *enceinte*.

In the above cut the space *RGK* is the main ditch, common to both fig. 2 and fig. 3; and *u*, fig. 3, and *k*, fig. 2, are the positions of batteries which might be con-

structed by the enemy to silence the fire from the triple flank at *e*. The outworks are, *p*, the *TENAILLE*; *q*, the *RAVELIN*; *r*, the *COVERED WAY*; and *s*, the *GLACIS*—described more fully under their separate articles. *a* is the covered passage across the main ditch to the outworks, and is called a *caponnière*.

BASUTOLAND, a country of South Africa, bordered on the north by Natal, south by the Albert Province of Cape Colony, west by the Orange Free State, and east by Kaffraria or Kafirland. It extends about 180 miles in length from north to south, by 50 miles in width, and contains about 8000 square miles. It is an elevated and rugged region, both healthy and productive, embracing the mountains and valleys which lie around the sources of the Orange River. The country is well watered, its principal rivers being the Orange, Caledon, Cornet Spruit, Klein Caledon, Putatsana, Tlotse, and Sengunyana. The chief mountains are the Drakensberg and Maluti, which average about 9000 feet in height; and the Qeme, Masiti, Berca, Tsikwane, Zeribe, and Jaangberg, which are from 6000 to 7000 feet. The climate is very healthy and pleasant, cool and temperate in summer, with abundant rains, and dry and bracing in winter, with occasional snow. There is but little wood found in the country, though grass is plentiful. The mountain scenery is very picturesque, several spots being of great beauty. The average height of the plains above the sea-level is about 5000 feet. The cultivated land is very fertile, the chief productions being wool, wheat, mealies, and Kafir corn, in each of which a

large trade is carried on with the diamond fields, the Free State, and the districts of Colesberg and Hope Town. Coal and iron and copper ore exist, but are not worked, agriculture being almost the only industry.

The Basutos are a branch of the great Bechuana group of Kafirs, superior to most of the other nations in intelligence and industry, but less warlike, and of smaller physical powers. From 1848 to 1854 they lived under a kind of semiprotectorate on the part of the British government, but on the abandonment of the "sovereignty" over the Orange River State, the Basutos were thrown upon their own resources, and left to maintain their independence as best they could. No definite limits had been assigned between them and the Free State, and the question of boundary became the foundation of an endless series of disputes. The principal chief of the tribe was Moshesh, a very able and intelligent leader; but before the superior arms and organization of the Boers, defeat and demoralization was inevitable. Driven to their last stronghold, the natives appealed to the British government; and in 1868 Sir Philip Wodehouse intervened, occupied the country, and proclaimed the Basutos British subjects. In 1871 Basutoland was formally annexed, as a magistracy province, to Cape Colony, but was retransferred in 1883 to the imperial government. The population is steadily increasing, and in 1885 it amounted to 150,000.

BAT was originally the name of a kind of pack-saddle, and a bat-horse was thus a baggage-horse, and a bat-man the servant in charge. A bat-man is now any soldier acting as servant to an officer; and in time of war about twenty horses or mules are allowed for the conveyance of certain specified stores to each battalion, which are called bat-horses or bat-mules. The money allowed for this purpose is also generally called bat-money.

BATA'TAS, the name of plants belonging to the genus *Ipomoea*. The root of *Ipomoea Batatas* was much eaten in the south of Europe before the cultivation of the potato, which both became a substitute for it and appropriated its name. Its native country is not known, but it is dispersed over all the warmer parts of the world, where it is still an object of culture for the sake of its roots, which, when roasted or boiled, are mealy, sweet, and wholesome, but slightly laxative. Its flowers resemble the common convolvulus, and are of a pale purple colour. The leaves are heart-shaped at the base, and are about half a foot long. This plant and its near allies are creepers or twiners. There are four cells in the ovary, and two stigmas at the end of the style.

BATA'VIA, a district in the northern part of the island of Java, which is divided into four departments, one of which consists of the city of Batavia and its suburbs. Near to the sea-shore the country is flat, but rises with a gentle acclivity, towards the south, to the mountain range which intersects the island from the western to the eastern extremity. This district is well watered. The river Jacatra, which joins the sea at the town of Batavia, dividing it into two nearly equal parts, has a bar at its mouth which prevents the entrance of any but the smallest boats. The chief products of the district are rice, sugar, cotton, fruits, pepper, and coffee. The population consists of Malays, Javanese, Arabs, Chinese, and Europeans.

BATA'VIA is a city on the north coast of Java, situated at the bottom of an extensive bay, about 60 miles E.S.E. of the Straits of Sunda, in 6° 9' S. lat., 106° 52' E. lon. It was formerly a native village called Jacatra. The English and Dutch had factories here; that of the former was established in 1618, that of the latter in 1612; but the Dutch, having conquered the country, founded the town of Batavia, to which they removed the government from Bantam in 1619. It finally became the capital of their East Indian empire, and the residence of the governor-general. It remained uninterruptedly in the hands of the

Dutch till 1811, when, Holland having become a province of the French empire, Batavia fell into the hands of the French, from whom it was taken by the English. By the treaty of 1815 it was restored to the Dutch.

Batavia is an important place, from its excellent bay and its advantageous position for European commerce. It stands at the mouth of the river Jacatra, in the midst of swamps and marshes. All the principal streets were formerly traversed by canals, planted on each side with rows of trees. These canals were at one time the common receptacles for all the filth of the town. In the dry season the stagnant and diminished waters emitted an intolerable stench, while in the wet season they overflowed their banks and left a quantity of offensive slime. From these united causes it is not surprising that Batavia was formerly considered the most unhealthy place in the world, and was designated the storehouse of disease. From 1730 to 1752 an account of the deaths was kept, which gave a total exceeding 1,100,000. During the French occupation the walls of the town were removed with the view of admitting a freer circulation of air, and with the materials the cantonment of Weltevreden was built, a short distance from the town inland. Upon the restoration of the island to the Dutch, the example of the French was extensively followed, and a new city with wide streets, commodious houses, and large squares, was built further inland. More recently the governor-general, sensible of the superior advantages of the old town as a place of trade, exerted himself to prevent its rapid decay by removing the causes of its unhealthiness, to accomplish which he widened several of the streets, filled up some of the canals and cleaned others, and demolished useless fortifications. The effect of these judicious measures has been that the place is now as healthy as any other town in Java. In the old town the most remarkable buildings are the custom-house, the bonding warehouses, the *lombongs* or coffee stores, the exchange, the bank of Java, and the Chinese and Portuguese hospitals. In the new city the large military barracks, the stadthaus, the military hospital, the Catholic church, the prison, the military club-house, and the theatre, are built round the square of Weltevreden. In Königs Plein (King's Square) there is a fine Protestant church, and between it and Weltevreden a new citadel. The square is used for military manoeuvres, and is surrounded by mansions of the wealthier classes. Along the Ryswyk Canal are the governor's house, Harmony House, where fêtes are given, and the house of the Literary Society. Among the literary and scientific establishments may be mentioned the Society of Arts and Sciences, to which belongs a museum of natural history. There is a society for the encouragement of medical science, and a model military and civil hospital to accommodate 600 patients. A medical school has also been founded for the natives of Java, in which the students are maintained at the expense of the Dutch government, and when duly qualified receive a diploma, an outfit of drugs and surgical instruments, and are sent to practise in the various dependencies. The school has been highly beneficial in many ways.

The number of inhabitants of Batavia in 1883 was estimated at about 100,000. The population is very varied, the Dutch residents being a comparatively small class, and greatly intermixed with Portuguese and Malays. The most important Asiatic element is the Chinese, who are both numerous and industrious. They were long greatly oppressed by the Dutch; and in 1742, in consequence of a supposed organized plan of insurrection on their part, the government perpetrated a most cold-blooded massacre, in which more than one-half of the Chinese were murdered. They have, however, maintained their position, and now enjoy many privileges which were formerly denied them.

The country around Batavia is very beautiful and fertile, though flat in the vicinity of the town. Markets are regularly held, which are remarkably well supplied with

fruit; the principal sorts are pine-apples, oranges, shad-docks, lemons, limes, mangoes, bananas, grapes, melons, pomegranates, custard-apples, papaws, mangosteens, and rambuteens, with many others mostly unknown in Europe. Fowls, ducks, and geese are plentiful and cheap; turkeys, pigeons, and wild-fowl are in general very scarce, and butcher's meat inferior and dear; of fish there is an abundant supply. The chief imports are opium and piece-goods; the exports, sugar, coffee, and spices. Salt also forms an important article of colonial commerce. Near Batavia there are some very extensive works for making salt from sea-water.

The anchorage of Batavia is a bay about 11 miles long and 6 wide, capable of containing any number of vessels of the largest size; it is studded with several small islands, averaging half a mile in diameter, all of which are now unoccupied, except Oornist, in which is the naval arsenal.

These islands protect the bay from any heavy swell; and, as the bottom is very tenacious, it becomes a perfectly safe anchorage. But when the sea-breeze blows strong it causes a cockling sea, which renders the communication with the town unpleasant, and sometimes dangerous. The rise of tide is about 6 feet.

BATH. a place for the purpose of washing the body, either with hot, warm, or cold water: the word is derived from the Saxon *bad*. The Greek name is *balanion*, of which the Roman *balneum*, or *balneum*, is only a slight variation; the elements *bal* and *bad* in the Greek and English words are evidently related, and the original signification is a place of warmth; indeed the word is allied to *bake*. The public baths of the Romans were generally called *thermae*, which literally means "warm waters."

The bath was in common use among the Greeks, though we are not well acquainted with the construction and economy of their bathing places. At Athens there were both private and public baths; the public baths appear to have been the property of individuals, who kept them for their own profit or let them to others.

Seneca says that the Roman baths were very simple, even mean and dark, in the time of Scipio Africanus; and it was not until the ædileship of Agrippa, whose new ideas were followed by the emperors after Augustus, that they were built and finished in a style of luxury almost incredible. Seneca (Æpist. lxxxvi.), who inveighs against this luxury, observes that "a person was held to be poor and sordid whose baths did not shine with a profusion of the most precious materials—the marbles of Egypt inlaid with those of Numidia; unless the walls were laboriously stuccoed in imitation of painting; unless the chambers were covered with glass, the basins with the rare Thasian stone, and the water conveyed through silver pipes." These, it appears, were the luxuries of plebeian private baths. Those of freedmen had "a profusion of statues, a number of columns supporting nothing, placed as an ornament merely on account of the expense; the water murmuring down steps, and the floor of precious stones."

Ammianus Marcellinus reckons sixteen public baths in Rome. The chief were those of Agrippa, Nero, Titus, Domitian, Antoninus, Caracalla, and Diocletian. These edifices were all constructed on a common plan. They stood in extensive gardens with walks, and were often surrounded by a portico. The main building contained large halls for swimming and bathing, some for conversation, others for various athletic and manly exercises, and some for the declamation of poets and the lectures of philosophers; in a word, for every species of polite and manly amusement. The noble rooms were lined and paved with marble, adorned with the most valuable columns, paintings, and statues, and furnished with collections of books for the studious who resorted to them. The most complete ruins of such structures at Rome are the baths of Caracalla and Diocletian.

The provincial towns had also their baths, both public and private. The public baths of Pompeii, the first of which were discovered in 1824, in a very perfect state, throw much light on the subject. Most of these baths occupy a space of about 100 feet square.

The baths at Rome were on a much larger scale. The public baths of Caracalla were 1500 feet in length, and 1250 in breadth; at each end were two temples, one to Apollo, and another to Æsculapius, as the tutelary deities of the place (*genii tutelares*), sacred to the improvement of the mind and the care of the body; the two other temples were dedicated to the two protecting divinities of the Antonine family, Heracles and Bacchus. Every citizen could enter on payment of the smallest coin. In the principal building were, in the first place, a grand circular vestibule, with four halls on each side, for cold, tepid, warm, and steam baths; in the centre was an immense square for exercise, when the weather was unfavourable to it in the open air; beyond it a great hall, where 1600 marble seats were placed for the convenience of the bathers; at each end of this hall were libraries. This building terminated on both sides in a court surrounded with porticoes, with an odeum for music, and in the middle a spacious basin for swimming. Round this edifice were walks shaded by rows of trees, particularly the plane; and in its front extended a gymnasium for running, wrestling, &c., in fine weather. The whole was bounded by a vast portico, opening into *exedrae*, or spacious halls, where the poets declaimed and philosophers gave lectures to their auditors. This immense fabric was adorned within and without with pillars, stucco work, mosaics, paintings, and statues. The stucco and paintings are yet in many places perceptible. Pillars have been dug up, and some still remain amidst the ruin; while the Farnese Bull and the famous Hercules, found in one of these halls, announce the multiplicity and beauty of the statues which once adorned the *thermae* of Caracalla. The baths of Diocletian are far larger, and contained 3000 marble seats. The walls were decorated with mosaics, with inlaid marbles, with silver lions' heads, from which issued the perpetual streams of hot water which filled the immense marble basins. From these splendid edifices would issue a swarm of ragged plebeians, who loitered, gambled, or drank away their lives, the ready tools of the first tyrant who flattered them. On entering these baths the bathers first proceeded to undress. They next went to the *elaothesium* (the oil-chamber), as it was called in Greek, or *unctuarium*, where they anointed themselves all over with a coarse cheap oil before they began their exercise (Plin. xv. c. 4, 7). This chamber of perfumes was full of pots, like an apothecary's shop; and those who wished to anoint and perfume the body received perfumes and unguents. When anointed the bathers passed into the *spharisterium*, a very light and extensive apartment, in which were performed the various kinds of exercises to which this part of the baths were appropriated (Plin. lib. i. Epist. 101). When its situation permitted, this apartment was exposed to the afternoon sun; otherwise it was supplied with heat from the furnace. After the exercise they went to the adjoining warm bath, wherein they sat and washed themselves. The seat was below the surface of the water, and upon it they were seraped with instruments called *strigils*, which were usually made of bronze, but sometimes of iron or brass. This operation was performed by an attendant slave. The use of the strigil is represented on a vase, found some time since on the estate of Lucien Bonaparte at Casimo. The vase is large and shallow, and painted within and without. From the drawings on it we learn that the bathers sometimes used the strigils themselves, after which they rubbed themselves with their hands, and then were washed from head to foot, by pails or vases of water being poured over them. They were then carefully dried with cotton and linen cloths, and covered with a light

shaggy mantle, called *gasaue*. Effeminate persons had the hairs of their bodies pulled out with tweezers. When they were thoroughly dried, and their nails cut, slaves brought them little vases of alabaster, bronze, and terracotta, full of perfumed oils, with which they had their bodies anointed, by causing the oil to be slightly rubbed over every part, even to the soles of their feet. After this they resumed their clothes. On quitting the warm bath they went into the tepidarium, and either passed very slowly through or stayed some time in it, that they might not too suddenly expose their bodies to the atmosphere in the frigidarium; for these last rooms appear to have been used chiefly to soften the transition from the intense heat of the caldarium to the open air.

Ancient Roman baths have been found in several of the Roman villas in England; that at Northleigh in Oxfordshire, near Blenheim, is one of the most perfect. Baths have been discovered also at Wroxeter in Shropshire, and near Arundel in Sussex. In the former the suspended pavement was very perfect; in the centre of a chamber in that near Arundel is an octagon bath sunk in the floor, the *palastris* of which is quite perfect. A very well preserved bath pavement was discovered in 1880 in the Isle of Wight, near Brading. There are also some curious Roman baths at Vallogne in Normandy.

The accounts of baths have here been confined to those of the Romans, because no people ever constructed them on such a scale of magnitude, or adapted them so extensively to general use. In the matter of drainage, supply of water, and public baths, the great cities of modern Europe are immensely inferior to those of imperial Rome. London alone has at last constructed a drainage which is worthy of a great city, but the supply of water is yet insufficient, and the quality is often bad. As to baths, although more general than formerly, they are still too few in private houses in London; and public baths are also few in number. A beginning, however, has been made with public baths; and there are now places in various districts of London, and other large cities, where either a hot or a cold bath may be had for a few pence. See BATHS AND WASH-HOUSES.

BATHING is very important to health, both for preserving a good condition of the body, and for curing disease. Considered generally, it resolves itself into the temporary surrounding of the body, or a part of it, with a medium different from that in which it is usually placed. The means employed for this purpose are generally water, watery vapour, or air of a temperature different from that of the common atmosphere.

The relative power and quickness of abstracting heat, with which different external media are endowed, vary with their density, conducting power, capacity for heat, &c., and hence arises a diversity of sensations, at the same absolute temperature. Thus, air at the temperature of 65° Fahr. feels pleasant, while water at the same degree feels somewhat cold. The organs of the body also differ in their power of sustaining the same temperature; hence, in the employment of vapour-baths, it is of importance to know whether the watery vapour is to be breathed or not, since, where it is to be breathed, the temperature must be much lower.

The ultimate action of cold, when extreme, is a sedative to the nervous system, and alters the circulation from external to internal. Moderate cold continued causes the same consequences as severe cold of short duration. Heat, on the other hand, is a stimulant to the nervous system, and alters the distribution of the blood from internal to external. Taking these principles as our guide, we proceed now to consider the different kinds of baths, and their action on the system in different states both of health and disease.

Water-Baths.—The common division is into cold and

warm, but various subdivisions are formed, marked by a certain range of temperature, which are designated

1. The cold bath, from 40° to 65°	
2. The cool " 65 " 75	
3. The temperate " 75 " 85	
4. The tepid " 85 " 92	
5. The warm " 92 " 98	
6. The hot " 98 " 112	

A healthy person upon entering a cold bath experiences a sensation of cold, followed by slight shuddering, and if the immersion has been sudden, a peculiar impression on the nervous system, called a shock. The skin becomes cooler and paler, the respiration hurried and irregular, the action of the kidneys increases, and the bladder contracts. In a few moments the colour and warmth return to the skin, and a glow is felt, especially if assisted by rubbing the surface. If the person remains more than five or ten minutes in the bath, the glow disappears, and paleness returns, which again gives place, though less quickly and perfectly, to a renewed glow. Should the stay in the water be greatly prolonged, no reaction ensues, but a general feeling of chilliness prevails, with quick feeble pulse, convulsive breathing, cramps of the limbs, or fainting. Very young or feeble individuals are either incapable of bearing the shock, or the reaction is so slight that they cannot endure to stay in the bath beyond a very short time.

The phenomena just described generally accompany cold bathing; and it is clear that we can recognize in them a series of three or even four distinct actions—1st, the shock; 2nd, the cooling effect; 3rd, the contraction or astringent effect; and 4th, the reaction. Cold bathing may be employed, therefore, in such a way as to insure the predominance of one action over any of the rest, according to circumstances, where all are not desired. They vary with the degree of cold and the suddenness of the application, as well as from the body being plunged into the water, or the water dashed against the body. Where the shock, as a stimulus to the nervous system, is desired, the water should be very cold, and where practicable should be dashed against the body, or, if the contrary, the stay in the bath should be momentary. Its stimulating effect is sometimes best procured by a local application, in the form of a stream of water falling on the head from a considerable height. The simplest example of this is the common practice of sprinkling the face with cold water in case of a tendency to faint; and in many diseases of the most dangerous character it is a remedy superior to any other. It is called the *cold dash*, or *douche*. In the melancholy and mania which overtake habitual drunkards it is of great efficacy, and also in cases of loss of nervous power from excessive mental exertion.

The cases of disease for which cold bathing is a valuable remedy are, morbidly increased irritability and sensibility, accompanied with general debility. If the sensibility be extremely high, it is best to begin with the tepid or cool bath, and pass gradually to the cold. Where there is a tendency to colds and rheumatism, the cold bath is an excellent preventive; for this purpose it should be used continually throughout the year, and the chest should be sponged with cold water, or vinegar and water may be substituted in winter, when there are not facilities for using the complete bath. Before beginning this practice, careful investigation of the state of the mucous membranes of the chest and intestinal canal should be made, as it will certainly prove hurtful where chronic inflammation of these organs exists. Where the increased irritability shows itself in the mental functions or in the muscular system, as in hypochondriasis or hysteria, cold bathing is very useful; and especially in the hypochondriasis of literary persons, accompanied with a disposition to indigestion, and a dry harsh *s' in*.

The cases in which the tepid bath is to be preferred to that of a different temperature are those of a febrile character joined to an irritability of the skin, which is generally dry and harsh; some cutaneous diseases, where, by friction, the scales are removed and a new surface presented; and, lastly, as preparatory to the cold bath in delicate persons, or for those whose peculiarities of system render them unable to bear a warm bath of a high temperature.

The primary effect of the application to the surface of the body of water of a temperature varying from 92° to 98° is, in consequence of the communication of warmth, the same as that of dry heat, viz. a stimulating, enlivening, and expanding effect. The secondary or ultimate effect is somewhat different. The increased action of the arteries gradually subsides, the pulse becomes fuller and slower, and the greatest quantity of the blood lodges in the veins, particularly in the great venous centres, such as the vena porta and the liver, which it stimulates to increased secretion of bile. Corresponding changes occur in all the other organs; and, if the application of the warmth be continued for a longer time, the increased energy and elasticity of the muscles disappear, and a sense of fatigue, with atony, and a tendency to sleep, succeeds. The final result of the action and reaction is an augmented secretion from the skin, and a corresponding diminution of urine, and of the secretion from the mucous surfaces.

The warm bath may be employed to effect two opposite ends—to stimulate, or calm and soothe. It accomplishes the first when its temperature is high (98°), and its use is confined to five or ten minutes; the second, when it is about 93°, and continued for three-quarters of an hour or an hour. As the warm bath has generally the effect of equalizing the circulation and relieving internal congestion, it is much resorted to as a remedy in spasmodic and convulsive diseases; but here the utmost caution and discrimination are necessary. The convulsions of infants during teething are almost invariably attempted to be removed by the warm bath, but in many instances more harm than good is done.

During the existence of all active inflammation, at whatever age, the warm bath may be pronounced an unfit measure. In few chronic inflammatory diseases is it allowable, if we except some of those of the digestive organs, especially subacute inflammation of the mucous membrane of the stomach and intestines. The other states to which warm bathing is unsuited are—great general torpor, but especially of the skin; also when there is a tendency to profuse secretion from the skin; when there is a great plethora or fullness of the vascular system, especially of the veins; in tendency to active hæmorrhage; in aneurism, or any disease of the heart; also in cases of a tendency to apoplexy; lastly, in extreme atony, or excessive irritability of the nervous system.

Water of a temperature from 99° to the highest which can be endured is termed the hot bath. When a person in health enters such a bath it greatly excites the nervous system, and through that the heart and arteries; causes heat and constriction of the skin, with disturbance of the internal organs generally, but especially those of secretion. This state of uneasiness is lessened by the breaking out of perspiration, which is succeeded by great languor, torpor, and disposition to sleep. The hot bath is a powerful stimulant, and in no case should it be used by persons in a state of health.

The vapour bath is distinguished from all other means of introducing more heat into the body, chiefly by the circumstance that as a portion of the vapour is converted into water by coming in contact with the surface of the body, it communicates a quantity of sensible caloric to it. It is without doubt the most powerful means of supplying a great heat to the greatest portion of the surface of the body, internal as well as external; for, when breathed, the

extensive surface forming the interior of the lungs is influenced by it in the same way as the skin. On the skin it exerts a peculiar influence. It does not cause that constriction of the skin which follows the application of dry air, nor does it exert that pressure upon the surface which, in the case of warm water, retards the breaking out of the perspiration. On the contrary, moisture of the skin, followed by profuse perspiration, occurs immediately upon entering the vapour bath.

In Russia, where such baths are used on a large scale, their employment is not found to be productive of weakness. The subsequent exposure to cold restores the tone of the skin which had been lost, and the process leaves the person with a general sense of good health, strength, and power, both of the internal organs and of the skin. The use of the vapour-bath would be found to ward off many acute diseases resulting from exposure to cold, if had recourse to immediately after exposure to the exciting cause, as after travelling, or falling into the water, in winter.

The employment of heated air, as an application to the body, causes the primary action of heat to manifest itself more than the secondary. The hot-air bath is therefore powerfully stimulant to the skin and nervous system, and is of great service in all cases where the production of animal heat is less than natural, as in the cold stage of fevers, and exhaustion of the nervous power. It has been employed beneficially in congestive fever, and after great and continual mental exertion. Of this class of bathing systems the Turkish bath at the present time holds the most prominent place. The chief features of the Turkish bath are—the production of copious perspiration by the use of heated air, bathing with cold water while under this, and the operation of “shampooing,” or “kneading,” as the act of pressing, squeezing, and twisting of the different parts of the body is sometimes called; in fact it is almost a reproduction of the ancient Roman bath with which we started at the beginning of the article.

In the preparation of medicated baths for the cure of disease, a great variety of substances have been brought into use. Thus the introduction of mustard in a foot bath, in which the feet and legs of the patient are immersed in hot water, will greatly assist its remedial action. This form of bath is useful in the early stages of bronchitis, congestion of the lungs, congestion of the heart, and is a favourite remedy with females for bringing on the menstrual flow. Nitro-muriatic acid baths, made by adding nitric and hydrochloric acids to hot water, in the proportion of 1 drachm to 2 or 3 gallons, are very useful in cases of torpid liver. Alkaline baths are used with advantage in cases of chronic or subacute rheumatism; and soda, iodine, creosote, chloride of lime, are all brought into use in the treatment of skin diseases. Baths of sulphur vapour are used for the cure of the itch, and have been tried in cases of lead poisoning, while the mercurial vapour bath is of undoubted value as a remedy for syphilis. The natural sulphureous and other mineral impregnated waters, especially those which rise in volcanic regions at very high temperatures, are most efficacious as baths for those diseases to which they are remedial. The baths of Loeche in Switzerland, and of Bormio in Upper Italy, are familiar examples out of the numerous establishments of this nature.

BATH, the chief city of Somersetshire, celebrated for its natural hot springs, is 110 miles from London by road, and 106½ by the Great Western Railway. It is also a station on the Midland Railway, and thus has easy access to all parts of the kingdom. The town is built partly on the sloping sides of a nearly circular basin, the streets being terraced one above another, and partly in the deep valley beneath, through which the river Avon flows.

Bath was a Roman station, mentioned by Ptolemy under the name of *Aquæ Calidæ*, in the country of the Belgæ.

It is also mentioned in the "Itinerarium" of Antoninus, under the name of *Aqua Solis*. It was intersected by the ancient Roman road leading from London into Wales, and by the road called the Fosse, which ran from Lincolnshire to the south coast of England. These two roads joined about 2 miles from Bath, continued in one course through a great portion of the parish of Walcot, and separated near Walcot Church. The Roman remains discovered in Bath and in its neighbourhood have been considerable. In the city itself the foundations of extensive buildings have often been traced. On the eastern side of the Fosse, near the north end of Stall Street, portions of a large temple were discovered, and are still preserved in the Bath Institution. Towards the east of this building stood the principal baths, the remains of which were discovered in 1755. In other parts of the city, altars with inscriptions, tessellated pavements, ornamented bricks, urns, vases, lacrymatories, fibulae, coins, &c., have been found. The new town is many feet above its ancient level; in some places more than 20.

Bath, unlike many other cities of Roman date in Britain, did not fall into utter decay when the Roman occupation ceased. The fame of its waters continued throughout Saxon times, for we find it known as *Akenan Cæster* ("the City of the Valetudinarians"), and subsequently as *Hæth Bathan*, and a place of much repute. On the site of the Roman temple of Minerva, Osric, king of the Hwiccas, founded a nunnery, for which a monastery was substituted by Offa, king of Mercia. Two centuries later Dunstan replaced the secular clergy by Benedictine monks, and crowned Edgar in the remodelled abbey in the presence of an enormous concourse of people. Though Athelstan established a mint here, and he and Edwy were both liberal benefactors to the abbey, it is not easy to assign a reason for this crowning honour of the coronation. The population was not so large as to give the city exceptional importance. In the struggle between Rufus and Robert, Bath was sacked and burned. It owed its restoration to John de Villula, bishop of Somersetshire, who chose it as the seat of his see in preference to Wells. For centuries thereafter Bath was of little consequence. During the civil war, in the reign of Stephen, Bath was in the possession alternately of the forces of the king and the Empress Matilda. It was garrisoned for Charles I., taken by the Parliament, recovered by the Royalists after the battle of Lansdowne, and finally given up to the Parliament in 1645. The battle of Lansdowne—one of the most determined but least decisive conflicts of the civil war—was fought on the adjacent heights between Sir Bevil Grenville and Sir William Waller, in which the former was slain. Charles II. visited the city in 1663. Queen Charlotte resided here some time in 1817. The modern celebrity of Bath dates from the time of Queen Anne, who, together with Prince George of Denmark, visited the town, and caused it to grow into favour. The celebrated Beau Nash greatly contributed by his influence to its improvement.

The first charter, constituting it a free borough, was granted to Bath by Richard I. It was made a corporate city by Queen Elizabeth; and another charter was granted to it by George III. The property of the corporation is very extensive, including lands and houses in the best part of the city, the hot springs of the baths and pump rooms, the cold springs which supply the town with water, and the tolls of the market.

Bath has returned two members to the House of Commons since the reign of Edward I. The population of the municipal borough in 1881 was 51,790; and of the parliamentary, 53,761. The number of voters on the register for 1884 was 6200.

The modern city of Bath is universally admitted to be one of the most beautiful in Great Britain, the variety of level giving very commanding sites for its fine and regular streets, crescents, and public buildings. The houses, which

are generally of a very elegant description, are all built of the white Bath freestone, which is abundant in the neighbourhood and easily wrought, and which gives the town an unusually neat and clean appearance. Its general beauty, coupled with its sheltered situation and consequent mild climate, and the efficiency of its medicinal springs, have long made it a favourite resort; but it no longer retains its former pre-eminence in this respect, being now surpassed by Brighton, and having formidable inland rivals in Cheltenham, Leamington, Buxton, and Harrogate. It is still, however, much frequented. Amongst the most prominent places are the Circus, in which the Doric, Ionic, and Corinthian orders are combined; the North and South Parades, Queen Square, and the Royal, Lansdowne, and Cavendish Crescents. There are many fine promenades in and around the city, in addition to the Royal Victoria Park and Sydney Gardens.

There was a monastery at Bath, which had existed from the earliest ages of Christianity, and which was surrendered to the crown in 1539. The Abbey Church belonged to this monastery, and the present building was begun in the reign of Henry VII., but was not completed till about 1609. This edifice is in the shape of a cross, with a very handsome tower rising from the centre. Its length from east to west is 210 feet, and from north to south 126. The height of the tower is 162 feet. The west front is decorated with numerous figures representing Jacob's dream, or as some say, the dream by which Bishop King—who lived in the fifteenth century—was called to rebuild the church. The building was thoroughly restored under the direction of Sir Gilbert Scott from 1859 to 1876. The restoration embraced the reparation of the exterior masonry and the roof, the strengthening of the foundations of the pillars in the nave, the substitution of a groined stone roof for a plaster one, the reseating with carved oak of the whole area, and the insertion of a magnificent east window. The church contains many monuments.

The Bishop of Bath and Wells has an annual income of £5000. The cathedral is at Wells, where the bishop has a palace. See WELLS.

The city contains many churches, and numerous chapels for various denominations of dissenters, as well as a Jewish synagogue. There are numerous charitable institutions, among which may be mentioned the Hospital of St. John, the Royal United Hospital, principally for casualty cases, and the Bath General or Mineral Water Hospital, enlarged in 1861, and affording accommodation for eighty-eight male and fifty-seven female patients.

There are two literary and scientific institutes, one of which, founded in 1823, has an excellent museum. There are also the Athenæum, formerly the Mechanic's Institute, the People's Club and Institute, and a free library and reading room. The Somersetshire College was established in 1858. An extensive and ornamental structure at Lansdowne was, in 1863, converted into a royal school for the daughters of military and naval officers. The Bath Proprietary College is now located in the building formerly known as the Sydney Hotel. The chief institution for instruction is the free grammar-school, founded by Edward VI., and endowed with part of the lands of the dissolved priory of Bath. The school-house is a large and handsome building with spacious premises. There is a Roman Catholic college at Prior Park, and a Wesleyan one, known as Kingswood College, which was removed from Kingswood, near Bristol, in 1851.

The Grand Pump Room Hotel, completed in 1869, corresponds in character with the New Pump Room built by the town council. It is a light, semiclassic pile, with advanced wings, which are surmounted by tall pavilion roofs, and has an imposing appearance.

The Guildhall is a commodious and well-built edifice in the High Street, in the popular classicism of the last century, and contains a banquetting room 80 feet long by 40,

in which there are portraits of royal and other celebrities. The Assembly Rooms are a handsome suite, the ball-room being 106 by 43 feet nearly, and 42 feet 6 inches high, and the tea-room 70 by 27 feet: they were erected by Wood. The theatre is an imposing and convenient building. The Bath and West of England Society, for the encouragement of agriculture, arts, and commerce, was founded at Bath in 1777.

The city markets were to a great extent reconstructed in 1863, some architectural appearance being given to them by a central enpola, 40 feet in diameter. A new supply of water was brought to the city in 1876 at a cost of £100,000. Bath is well supplied with coal from extensive beds lying a few miles distant. The town gives the title of marquis to the family of Thynne of Longleat. Bath was the birth-place of the following eminent men:—Gildas, the old historian of the sixth century; John Hales, professor of Greek at Oxford in the seventeenth century; Benjamin Robins, the mathematician, author of "Anson's Voyage Round the World," who died in 1751; and William Hone, author of the "Every-day Book." Fielding, the novelist, is said to have depicted in the character of Allworthy in "Tom Jones," the host of Prior Park, whose guest he was. Prior Park was subsequently the residence of Bishop Warburton.

The remarkable peculiarity of Bath is its natural hot springs, which are vested in the corporation. The temperature of the three springs is as follows:—Hot Bath 117°, King's Bath 114°, and Cross Bath 109° Fahr., yielding respectively 128, 20, and 12 gallons a minute. The specific gravity of the water is 1.002. As it flows from the earth it is transparent, but in a short time yields a slight precipitate and loses its transparency. When fresh drawn, it has a slight chalybeate taste. A considerable quantity of carbonic acid gas escapes through the water.

Taken internally the water acts as a stimulant. Its use is most successful in cases of palsy, rheumatism, gout, leprosy, cutaneous disease, and especially in cases of scrofula affecting the joints, such as the knee, elbow, hip. It cannot be used without danger in cases accompanied with fever, cough, or pain in the chest, open sores or ulcers, or in cases where there is reason to suspect internal suppuration, hæmorrhage, rupture, mania, or plethora. From improper internal use mischievous results have frequently ensued.

BATH, a town of Maine, United States, is situated 30 miles S. of Augusta, and 34 miles N.E. of Portland by railway, on the right bank of the Kennebec river, 12 miles from the ocean. It depends almost entirely upon its shipbuilding and fisheries. Steamers ply regularly from Bath to Portland and to Boston, 111 miles distant. The population in 1880 was 7874. Bath is also the name of a great many small towns and villages in the United States.

BATH or **GREAT OOLITE** is a geological formation, constituting part of the Lower OOLITE. In the lower strata the beds near Bath and Corsham furnish "Bath freestone," a very valuable building stone, though more suited for interiors than exteriors on account of its softness. The city of Bath is almost entirely built of "Bath stone." In other districts its place is taken by the STONESFIELD SLATE. The upper beds are quarried for building stone, road metal, or for lime. Beds of blue clay are intercalated in the limestone, and are sometimes worked for brick-making. The soil formed of the great oolite is not good for agricultural purposes, as there is no great depth of it, and rain-water readily passes through. Green crops ploughed in would improve it, by furnishing decaying vegetable matter, and absorbing more moisture. The lower strata show in their false bedding evidences of currents; but the upper strata were deposited in a clear sea, not subject to any disturbing influences. The fossil crinoids or stone-lilies are evidence of the absence of any slowly depositing sediment, for they only flourish in clear water, and Lyell points out, too, that the presence of serpula on some of

these stone lilies shows how gradually the limestone was formed, and what a length of time was necessary for the production of even a thin layer. Among characteristic fossils may be mentioned the gastropods, *Nerinea trachea*, *Patella rugosa*, and *Rimula clathrata*.

BATH, KNIGHTS OF THE, so called from the ancient custom of bathing, symbolical of purification, previous to their installation. Camden and Selden agree that the first mention of an order of knights, distinctly called Knights of the Bath, is at the coronation of Henry IV. in 1399, and there can be little doubt that this order was then instituted.

It became subsequently the practice of the English kings to create Knights of the Bath previous to their coronation, at the inauguration of a Prince of Wales, at the celebration of their own nuptials, or those of any of the royal family, and occasionally upon other great occasions or solemnities. Sixty-eight Knights of the Bath were made at the coronation of King Charles II., but from that time the order was discontinued till it was revived by King George I. under writ of Privy Seal during the administration of Sir Robert Walpole. The statutes and ordinances of the order bear date 23rd May, 1725. By these it was directed that the order should consist of a grand-master and thirty-six companions, a succession of whom was to be regularly continued. The officers appropriated to the order, besides the grand-master, were a dean, a registrar, king-at-arms, genealogist, secretary, usher, and messenger.

The badge of the order was directed to be a rose, thistle, and shamrock, issuing from a sceptre between three imperial crowns, surrounded by the motto "Tria juncta in uno." The material, construction, and manner of wearing the badge, collar, star, and installation dress, were all distinctly laid down. In honour, the order ranks next to that of the Garter.

In 1815 the prince regent, on the termination of the long war in which the kingdom had been engaged, ordained that thenceforward the order should be composed of three classes, differing in their ranks and degrees of dignity. The first class (G.C.B.) to consist of knights grand cross, which designation was to be substituted for that of knights companions previously used. The second class was to be composed of knights commanders, who were to have precedence of all knights bachelors of the United Kingdom—no person to be eligible to the class of K.C.B. unless he had attained the rank of major-general in the army or rear-admiral in the navy. The third class was composed of officers holding commissions in her Majesty's service by sea or land, styled companions of the order. No officer could be nominated a companion of the order unless he shall previously have received a medal or other badge of honour, or shall have been specially mentioned by name in despatches published in the *London Gazette* as having distinguished himself. The bulletin announcing the remodelling of the Order of the Bath was dated Whitehall, 2nd January, 1815. But though the constitution of the order had been made more liberal by the bulletin of 1815, it was not till 1847 that civilians were made eligible to this dignity. It was then put on its present footing, by their admission as civil knights, commanders, and companions. The classes now are:—Knights Grand Cross (G.C.B.)—military, 50; civil, 25. Knights Commanders (K.C.B.)—military, 100; civil, 50, with the title of *Sir*. Companions (C.B.)—military, 525; civil, 200.

BATH GATE, a market-town in the county of Linlithgow, Scotland, is 6 miles S. by W. from Linlithgow, and 17 miles W.S.W. from Edinburgh. It is a burgh of barony, and governed by a provost, three bailies, and twelve councillors. It consists of an old part, situated on a steep acclivity, at the base of a low ridge of hills, and a new and more regular part, on level ground and well laid out. There are coal, iron, lime, and oil works in the vicinity,

and the chief branch of industry in the town is the manufacture of gingham, pullicates, plaids, and shawls for Glasgow houses. It has an excellent academy and many other useful institutions. A little to the S. of the town are the remains of the castle of Walter, high-steward of Scotland, who died 1328. He had married the daughter of Robert the Bruce, and the barony passed to him from her father. The town was made a free burgh of barony by Charles II. in 1668.

BATHS AND WASH-HOUSES, ACTS REGARDING. Among the various movements set on foot for improving the sanitary condition of the poorer classes, subsequent to the visitation of cholera in 1842, was that of the establishment of public baths and wash-houses. Two societies, the Committee for the Houseless Poor, and an Association for Promoting Cleanliness among the Poor, were formed, about 1844, for the erection of these very useful establishments. By their labours the attention of the legislature was called to the matter, and by the Acts 9 & 10 Vict. c. 74, passed in 1846, and 10 & 11 Vict. c. 61, passed in 1847, borough councils and parish vestries were empowered to establish public baths and wash-houses, supported by the rates of the householders, should they give their sanction. By these Acts it was provided that the council of any incorporated borough might adopt their provisions; and also any parish not within an incorporated borough, subject to the approval of the secretary of state; or the vestries of any two or more parishes may combine for the same purpose. In boroughs the expense may be charged upon the borough rates, or a separate rate may be levied for the purpose; and in parishes not forming part of a borough, the expense is to be charged upon the poor-rate. In boroughs the management is vested in the council; and in parishes not within boroughs the vestry must appoint certain ratepayers to be commissioners for carrying out the provisions of the Act. By the 45 & 46 Vict. c. 30, passed in 1882, the Act of 1846 was amended by the addition of the words, "or in the immediate neighbourhood of such borough and parish," in order to give increased facilities to local authorities for providing baths and wash-houses within convenient reach. By a schedule attached to the Act 10 & 11 Vict. c. 61, the charges are fixed, and by it the price of a single cold bath is not to exceed 1d., or a single warm, shower, or vapour bath 2d. For an open bathing place, where several bathe in the same water, each person is to be charged ½d. If, in addition, baths of a better class are provided, the price of these may be fixed by the managers at any sum not exceeding three times these amounts. In the wash-houses, which must be fitted with every necessary convenience, the charge is not to exceed 1d. for the first hour, or 3d. for two hours together.

There can be no question as to the utility and benefit of these institutions, and it is to be regretted that the provisions of the Acts relating to them have not been more largely adopted. It has been found in actual practice, that although the prices charged are not sufficient to meet the necessary cost of the maintenance of the baths and wash-houses, yet the deficiency amounts to so little as to be hardly felt by the ratepayers. On the other hand, no person who has any knowledge of the dense crowding of the poorer classes in our great cities, and the character of the homes in which they dwell, can doubt for a moment that the erection of a house where a bath may be had for a trifle, or where clothes may be conveniently and expeditiously washed and dried away from the dwellings, is one of the best ways of adding to their health and comfort, and of promoting habits of cleanliness and decency.

BATHURST, a town in New South Wales, so named in 1815 by Governor Macquarie, in honour of Lord Bathurst, then secretary of state for the colonies, is the principal town in the western district of the colony. It is situated on the south bank of the Macquarie river, on high

ground, 2153 feet above the sea-level, surrounded by hills, and is distant from Sydney, with which it is in direct communication by railway, 144 miles nearly due west. Bathurst may be considered the third town of the colony, and its importance is steadily increasing. It has numerous well laid out streets of ample width crossing each other at right angles, with a square in the centre planted with trees. The public buildings are numerous, and almost metropolitan in their character; they comprise several places of worship—the Anglican Cathedral, Roman Catholic Cathedral and Convent, the Presbyterian Church, Congregational Church, Baptist Church, and others; court-house—a massive pile of buildings—gaol, and town-hall; numerous schools, a school of art, and a fine hospital. Bathurst was erected into a municipality in 1862. The population in 1881 was 7391. The country surrounding Bathurst is agricultural and pastoral, consisting of extensive fertile plains, very productive, and especially suited to the growth of cereal crops; but gold and copper mining are also very largely carried on, though not in the immediate vicinity. It was about 20 miles from Bathurst that gold was first discovered in Australia in 1851. The town supports four newspapers and numerous industries.

BATHURST, the capital of the British possessions on the Gambia, is situated on the south-eastern extremity of St. Mary's Island, at the mouth of the Gambia, in 16° 6' W. lon., and 13° 28' N. lat. The settlement has made rapid advances in improvement. Many substantial government buildings have been erected. The market is well supplied with beef, mutton, poultry, fish, fruit, milk, butter, palm-wine, and vegetables, by the natives of the surrounding country, who consume a large proportion of the European articles imported into the colony. Gold, ivory, bees' wax, and hides are brought to Bathurst in considerable quantities.

BATHYBIUS. In the year 1857 H.M.S. *Cyclops*, under the command of Captain Dayman, was sent to investigate the sea-bottom, with a view to laying the Atlantic telegraph cable. In his report Captain Dayman said, "Between the fifteenth and forty-fifth degrees of west longitude lies the deepest part of the ocean, the bottom of which is almost wholly composed of the same kind of soft mealy substance which, for want of a better name, I have called ooze. This substance is remarkably sticky, having been found to adhere to the sounding rod and line through its passage from the bottom to the surface—in some instances, from a depth of more than 2000 fathoms." This deep-sea mud was examined by Professor Huxley, and in addition to the calcareous shells of Globigerinae which form its constituents, he described it as containing "innumerable lumps of a transparent gelatinous substance. These lumps are of all sizes, from patches visible with the naked eye to excessively minute particles. When one of these is submitted to microscopical analysis it exhibits—embedded in a transparent, colourless, and structureless matrix—granules, coccoliths, and foreign bodies." These granules and the gelatinous matter, he thought, represented masses of protoplasm, and in that case he supposed them to be forms of Monera, the simplest living beings, simpler even than the Amœba. He gave this new moner the generic name of *Bathybius*. Further examination of ooze during the voyage of the *Challenger*, led Professor Huxley himself to the conclusion that *Bathybius* was "little more than sulphate of lime precipitated in a flocculent state by strong alcohol."

BATLEY, a town and municipal borough in the West Riding of Yorkshire, 198 miles from London and 2 miles north of Dewsbury, with which it is associated for parliamentary purposes. The parish contains 6390 acres. It is principally in the wapentake of Aggbrigg, but partly also in that of Morley; the town, which has 27,505 inhabitants, is in the former. The population both in the town and the contiguous district is principally engaged in the "shoddy" trade—or the conversion of old clothes into material for

new cloth, for army cloth, flushings, pilots, druggets, &c. The church, built in the reign of Henry VI., has several monuments of the Fitzwilliam, Saville, and other principal families in the vicinity. There are also a good market-house, a handsome public hall, and a well-endowed free school founded in the reign of James I.

BAT'ON, a short staff of authority, as, for instance, a field-marshal's baton. One of those sayings with which Napoleon fascinated the French people was, "Every private carried a marshal's baton in his knapsack," if only he had good luck and genius to discover it there. But the baton most often seen in England is the humble baton of the conductor of an orchestra—quite a recent innovation—popularized by Mendelssohn, though probably first used in England by Spohr, in 1820, at the Philharmonic concerts; before then the *maestro* conducted at the pianoforte. Batons are generally made of maple, tapering from three-quarters of an inch to half that diameter, and about 21 inches long. Berlioz and Mendelssohn exchanged batons at Leipzig in 1841; and a note of Berlioz, in heroic Indian vein, "Au Chef Mendelssohn," is still preserved. He ends (calling his baton a tomahawk), "Sois mon frère, et quand le Grand Esprit nous aura envoyés chasser dans les pays des âmes, que nos guerriers suspendent dans les tomahawks à la porte du conseil." A silver or gold-mounted baton is a very usual and appropriate present to a popular conductor.

BAT'ON ROUGE, a town in the state of Louisiana, in the United States, situated on the left bank of the Mississippi, 129 miles above New Orleans, 75 miles direct distance. It stands on the first bluff met with on the left bank, at the height of 25 to 30 feet above the highest level of flood-water. The esplanade in front of the town presents an extensive view west and south over rich alluvial plains of the delta of the Great River. In 1847 the seat of government was removed here from New Orleans on account of the salubrity of the climate, but it has since been again transferred to New Orleans. The town was the scene of several important military operations during the American civil war. The name is derived from a tall red cedar, without branches, found growing here when the place was first settled. The population of the town in 1880 was 7197.

BAT'OM, a seaport of Russia in Asia, on the east shore of the Black Sea, lat. $41^{\circ} 37' N.$, lon. $41^{\circ} 40' E.$ The harbour, which is open to the E.N.E. and N., is defended on the W. by a projecting tongue of land, and has deep water, large ships anchoring within a few feet of the shore. It is the safest and most important on the eastern coast of the Black Sea. The town, which formerly belonged to Turkey, was ceded to Russia by the treaty of Berlin in 1878, and has since been considerably improved and enlarged.

BATRA'CHIA (Gr. *batrachos*, a frog) is an order of AMPHIBIA comprising FROGS and TOADS. The members of this order undergo a series of metamorphoses. On emerging from the egg they have an elongated body, a compressed swimming tail, external gills for breathing, and no feet. They are in this stage known as tadpoles, and live entirely in the water. Gradually their form changes, their tail is

absorbed, they develop limbs and acquire lungs, and become perfect frogs or toads, henceforth spending much of their time on land.

The Batrachia have been divided by Dr. Günther into three groups, according to the absence, presence, and form of the tongue. The best known and most numerous genera have a soft fleshy tongue, which is fixed to the jaw in front, but free behind. These form a group known as Opisthoglossa (Gr. *opisthen*, behind; and *glōssa*, tongue). Of the second of Dr. Günther's groups, Proteroglossa (Gr. *protero*, in front), in which the tongue is free in front, there is but one genus, Rhinophrynus. Lastly, the Aglossa (Gr. *a*, not), which have no tongue, are represented by the curious Surinam toad, belonging to the genus Pipa. The first group, Opisthoglossa, is subdivided into Oxydaetyla, having sharp-pointed toes, composed of the true frogs and toads; and Platydaetyla, having the toes dilated at the tips into small pads, comprising the tree-frogs. In the frog, teeth are found on the upper jaw, and two small patches of teeth are developed in many species on the vomers; toads have no teeth. The hind limbs are webbed, and are much longer than the fore limbs. As the ribs are quite rudimentary, the process of respiration differs from that of other lung-bearing animals. The mouth is closed, and air



Mouth of *Polypedates Schlegelii*—to show form and structure of the tongue of the Opisthoglossa



Bull frog (*Rana mugiensis*).

taken in through the nostrils, which are then closed and the air driven forcibly down into the wind-pipe. The air is, in fact, swallowed down, so that a frog can be suffocated by keeping its mouth open. Respiration is also carried on by means of the skin. The well-known croaking sound is produced by the vibration of two membranous pouches, called vocal sacs. These, placed on each side of the lower jaw, open into the cavity of the mouth, and are filled with air from the lungs. In some species there is but one vocal sac. The croak uttered by the bull-frog (*Rana mugiensis*) is so loud as to resemble the distant bellowing of bulls. No Batrachia are found on any oceanic island, but when introduced by man have multiplied to an enormous extent. The reason for this is considered by Darwin to lie in the difficulty of their transportal across the sea, since both

the animals themselves and their spawn are immediately killed by salt water.

There are but three species of this order found in the British Isles. These are the common frog (*Rana temporaria*), the common toad (*Bufo vulgaris*), and the water-jack (*Bufo calamita*).

BATRACHOSPERMUM. See ALGAE.

BATS (Chiroptera) form a very remarkable order of MAMMALIA. For many ages considerable doubt existed as to the bat's place in nature. In Deuteronomy it is found included in the list of "unclean birds," which the Jews were forbidden to eat. Both Aristotle and Pliny considered it to be an abnormal bird, and it undoubtedly furnished material for the well-known myth of the Harpies. In spite of the authority of Albertus Magnus, who was fully acquainted with its true nature, the error was not finally abandoned till the end of the seventeenth century. Our ancestors indeed seem to have had clearer notions on the subject, for the Old English name was *flittermouse*, cognate with the German *fledermaus*. Bats are now, however, clearly seen to be truly flying mammals, and in their powers of flight they differ very considerably from the flying squirrels and flying lemurs. In these latter animals the skin of the flanks is extended outwards to the limbs, serving to sustain the body in the air as they leap from bough to bough. A tree-frog which Wallace met with in Borneo has very long webbed toes, enabling it to leap from high trees without injury. A lizard, the *Draco volans*, can sustain itself in the air for a short time by means of its prolonged hind ribs, which support a membrane of extensible skin. It will be seen that none of these animals can truly be said to fly. On the other hand, the pterodactyle, a fossil reptile which existed in the Secondary period, resembled bats in possessing the power of true flight, having membranous wings armed at the extremities with claws.

A reference to the skeleton of the bat (Plate MAMMALIA) will show how closely it adheres to the fundamental mammalian type. The hind limbs are of moderate length and furnished with five unwebbed toes, each armed with a

are left free, and each is armed with a claw. The bat resembles the mole, to which indeed it is most closely allied, in the possession of a ridge or keel on the breastbone, corresponding to the keel found in birds. This keel, in the case of bats and birds, serves for the attachment of the very large muscles needed for flight. In the case of the mole, the keel supports the powerful breast-muscles required by the burrowing habits of this animal. Though the whole framework of the body is rendered as light as possible, the bones contain no air-cells, and so differ from birds. There are two mammae situated on the breast. The eyes are small, but the ears of many species are enormously large—those of the LONG-EARED BAT, a common British species, being almost as long as the entire body. In most species the *tragus*, or little lobe guarding the internal ear, is greatly developed. The nostrils in some species are provided with leaf-like appendages, which probably, while aiding the sense of smell, act also as organs of touch.

The family Rhinolophidae are called HORSE-SHOE BATS, from the fact that their nasal appendages assume somewhat the form of a horse-shoe. The experiments of Spallanzani

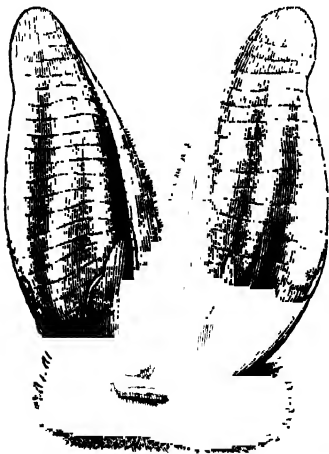


Head of the Greater Horse-shoe Bat (*Rhinolophus ferrumequinum*).

have shown that the sense of touch, which is remarkably keen in all bats, lies in the extreme sensibility and delicacy of the wing-membrane, and the contractibility of the bloodvessels which course through it.

Though specially fitted by nature for an aerial life, the bat can also walk, or rather crawl, upon the earth. This it does clumsily, resting on its wrists and hind feet, and dragging itself forward by means of its strong clawed thumbs. When at rest bats usually hang head downwards, supported by the claws of their feet. Sometimes they suspend themselves by the claws of their thumbs. The female brings forth one or two young ones at a birth, which are born naked and blind, and are carried about by the mother.

Bats love darkness, haunting hollow trees, caves, and ancient ruins, and only leaving their retreats at the approach of night. The physiological changes which bats undergo during their hibernation are thus described by Professor Owen:—"The breathing becomes gradually slower than in ordinary sleep, the pulsations of the heart diminish in force and frequency, the supply of stimulating arterial blood to the muscles and the brain is progressively reduced, relaxation of the muscular fibres is converted into stiff inaction, and sleep sinks into stupor; at length respiration entirely ceases, and with it those chemical changes in the capillary circulation on which animal heat mainly depends. The preservation of life in its passive or latent state is now due to the irritable property of the heart's fibre, which is excited to contract by the blood in its present dark or carbonized state, and continues to propel it slowly over the torpid frame during the whole period of hibernation. This slow circulation of venous blood through both the pulmonic and systemic vessels is the only



Head of the Long-eared Bat (*Plecotus auritus*).

long curved claw. But the structure of the fore limbs or arms differs considerably. The fore arm is of great length, and, as the ulna is very small and immovably fixed to the radius, it is devoid of that rotatory motion which obtains among many mammals. The fingers are enormously elongated, and connected by a membrane which extends to the sides of the body and the legs, and in many cases connects the tail with the legs. This membrane is an expansion of the skin of the body. The thumbs, which are very small,

recognizable vital act during that period, and the material conveyed by the absorbents into the circulating fluid is sufficient to counterbalance the slight waste thus occasioned. So long, therefore, as the state of torpidity continues, the bat is independent of supplies from without; but it purchases that independence by a temporary abrogation of its vital faculties. Cold, senseless, motionless, and asphyxiated, its entry into death's chamber is prevented only by its being brought to his very door." With the exception of the **FRUIT BATS** (*Pteropidae*) they are nearly all insect feeders.

Bats are world-wide in their distribution, and are found on almost every oceanic island.

The following classification is that of Mr. Dobson. He divides bats into the following families:—1. *Pteropidae* or **FRUIT BATS**. 2. *Rhinolophidae* or **HORSE-SHOE BATS**. 3. *Nycteridae*, including the **LEAF BATS**. 4. *Vespertilionidae*, which includes all our British bats, the best known and commonest of which are the **LONG-EARED BAT**, the **PIPISTRELLE**, and the **NOCTULE**. 5. *Emballonuridae*. 6. *Phyllostomidae* or **VAMPIRE BATS**, which includes most of the bats that are accused of the habit of blood-sucking.

With regard to their distribution in time there can be no doubt that bats appeared at a comparatively recent period, the earliest fossil remains having been found in the Eocene deposits of the Tertiary period. This fossil bat is called *Vespertilio parisiensis*, being found in the gypsum beds of Montmartre, near Paris. The horse-shoe bats have as yet only been discovered in cave-deposits. In Brazil five species of vampire bats have been found in Post-pliocene cave-deposits. The Vespertilionidae are represented by fossils in Miocene, Pliocene, and later deposits from Kent's Hole, near Torquay, and from the Mendip Hills. See **PLATE BATS**.

BATTAL'ION. This name is applied in the British army to four or more companies of infantry. The number of men composing a battalion is variable. One thousand is presumed to be the largest number which, when drawn up in array, can conveniently bear the word of command from an officer; and in whatever other particulars the armies of Europe differ, they seldom depart very far from a mean of 1000 men per battalion. In Mr. Gladstone's first government Lord Cardwell, in 1870, introduced the territorial principle, giving to certain associated regiments a "local habitation and a name;" and this was completely carried out by Mr. Childers in Mr. Gladstone's second government, which came into power in 1880. [See **ARMY**.] We now have the "Bedfordshire Regiment," the "Berkshire Regiment," &c., each with its four battalions—two of regulars, two of militia; and these battalions are the old numerical regiments. Thus, the "Border Regiment" contains the old 34th Foot, the old 55th Foot, and the Cumberland and Westmoreland militias. But in the case of the earlier regiments on the old numbering, those with the two battalions, these are both included in the same territorial regiment on the new plan. Thus the "Bedfordshire Regiment" contains the 1-16th, the 2-16th, and the Bedford and Hertford militias. It is hoped, and with reason, that under this plan neighbours will be fellow-soldiers, and that each regiment will be widely recruited in its own district.

A battalion is generally divided in the British service into ten service companies, and when these are drawn up on parade, two ranks in depth, they extend about 390 yards in length. The battalion is commanded by its own lieutenant-colonel; and several battalions or regiments are, on service, united under one general officer. These constitute a brigade, and may be considered as a small legion.

The major or captain of a company is placed behind the centre of the rear of his company, and a subaltern officer on each flank. The introduction of breech-loading arms has necessitated this, as in the former position the

captain occupied (on the flank) he could not supervise and check the fire of the men composing the company, as he can from his present position.

The mounted officers—lieutenant-colonels, majors, and adjutant—are placed where they can best see the men under their orders.

BATTENS are pieces of timber 6 feet or more in length, 7 inches in width, and usually from 2 to 2½ inches in thickness. *Deals* differ from battens in being always above 7 inches wide, and *batten-ends* in being under 6 feet long. When cut into two boards, about an inch thick (or for slight work three boards), battens are used for flooring; and when sawn into long pieces about 2½ inches by 1½ inch, they are set upright against walls, to carry the lath and plaster, in cases where the dampness of the wall, or other circumstances, render it desirable to make the wall hollow. The small bars are themselves called battens, and the term is further applied to any piece of wood nailed across jointed boards, to prevent their warping or separating; or across wide boards, to strengthen them or keep them from splitting.

BATTERING-RAM, an engine of war used in ancient and mediæval times for effecting a breach in the walls of a fortress. It consisted of a long heavy beam of timber, armed at the extremity with a mass of metal, generally of iron, often cast in the form of the head of a ram, whence its name. The simplest and smallest kind was lifted and swayed by the hands of the soldiers, but in its larger and more improved form it was suspended from a beam, which was supported at the ends by posts, and the necessary momentum was imparted by means of ropes. The beam sometimes reached a length of 120 feet, the head weighing upwards of a ton, and 100 men being employed to work it. To protect the workers it was provided with a wooden roof, and screens of hides were hung along its front and sides. Another kind of ram was moved by means of rollers. It is twice mentioned in the Old Testament (Ezek. iv. 2, and xxi. 22); and Josephus, in his account of the siege of Jerusalem, declares that no wall could hold out against its repeated attacks. It was used in more modern times, by Sir Christopher Wren, in the demolition of the ruins of old St. Paul's, the householders of the neighbourhood having petitioned against the use of gunpowder. For an illustration of a battering-ram, see **PLATE I., ARTILLERY**, vol. I.

BATTERSEA, a suburban district of London, in the county of Surrey, 3 miles S.W. from Westminster Bridge. It is connected with Chelsea by a handsome suspension bridge constructed in 1858, from the designs of Mr. T. Page, at a cost of £88,000. Just below it is the noble iron bridge—the widest in the world—which carries across the river the Brighton and South Coast, the London, Chatham, and Dover, and Great Western railways. Battersea Park was first laid out in 1855; it has an area of nearly 200 acres, of which 23 are ornamental water. The park has a fine subtropical garden, which is one of the sights of London in the latter part of the summer. The parish church is an old and ugly building, containing the tomb and monument of Lord Bolingbroke. There are several other churches of recent erection, and numerous denominational places of worship. The area of the parish is 3020 acres, and the population in 1881 was 107,262, more than double that of 1861.

BATTERY, in military language, is a term having various significations. It is the name given to a number of artillerymen corresponding to a troop of cavalry or a company of infantry. Until 1859 the latter terms were in use in the artillery, the complement of officers and men necessary for a set or battery of guns being termed in the horse artillery a troop, and in the foot artillery a company; but since that year the term battery has been used instead in the army regulations. In the horse batteries, consisting,

in peace, of five officers and 151 men, both officers and men are mounted. In the field batteries, in which the officers are mounted and the men on foot, there are, in times of peace, five officers and 152 men, the number in time of war being increased to 277. A garrison battery usually consists of three officers and a number of men, varying from 100 to 150 according to the number and character of the heavy guns intrusted to it.

The term is also used in relation to the pieces of ordnance, together with the necessary horses, gun-carriages, ammunition waggons, &c., under the charge of such a division of men. In the British army a battery in field operations usually consists of six guns, and in the French and German armies of the same number. In the Russian army it comprises twelve.

The name battery is also given to any number of pieces of ordnance placed in position, either for defence or attack. In the latter the designation of a battery varies with the purposes to be accomplished, the nature of the ordnance employed, and the manner in which the firing may be made.

A *breaching battery* is one which may be placed in position against any wall or rampart in order to demolish it; and the effect is produced by firing directly, or, as it is called, *point blank*, at the object. Such a battery generally has its front parallel to the face of the wall to be breached.

An *enfilading battery* is one whose front is perpendicular to the produced line of the enemy's rampart, so that the shot from the guns may graze the interior side of that rampart or its parapet, in the direction of its length.

A *mortar battery* is one in which shells are thrown from mortars at a great elevation of the axis of the piece, so that, by the momentum acquired in falling, they may crush the roofs, and by their explosion complete the destruction of magazines or other buildings.

BATTERY, in law. See ASSAULT AND BATTERY.

BATTERY, ELECTRIC and GALVANIC. An electric battery is made up of a number of Leyden jars, arranged as in the Plate, fig. 1. Both the inside and outside of each jar are lined with tin-foil to within 2 or 3 inches of the top. These jars are contained within an open wooden box, whose interior is lined with tin-foil; a piece of wire passes through the foil and the side of the box, and carries on the exterior of the latter a ring, to which should be affixed a chain descending to the table or ground. The ball or knob at the top of every jar is perforated, in order that it may receive the brass rod or system of bars by which the tops of all the jars are to be connected together. The rods are terminated with brass balls, and one of these, or a ball at the upper extremity of a pillar forming part of the system, is presented to the conductor of the electric machine when the battery is to be charged. The power of a battery is estimated by the quantity of metallic wire which, when fully charged, it will ignite or melt, or by other ordinary electrical methods.

The batteries in which electricity is excited by chemical action are called galvanic or voltaic (after the discoverers Galvani and Volta respectively), and are of various kinds.

The simplest combination which can be formed for the production of an electric current by such means is that of a plate of zinc and a plate of copper (generally in vertical positions and parallel to one another) placed in a vessel containing a diluted acid, the upper edges of the metals, which are quite free from the acid, being connected by a copper wire. Such an arrangement is called a voltaic "cell." In this state a current of positive electricity passes from the zinc, *z*, through the acid, to the copper, *c*, and from the copper, along the wires, *w x*, back to the zinc. See Plate, fig. 3.

But for the purpose of obtaining a powerful electro-motive force, there are combined together a considerable number of such voltaic cells, the zinc of one coupled to the copper of the next by wire and suitable clamps, and the

circuit made by joining the terminal wires of the whole series, as in fig. 2. The reader is referred to the article **ELECTRICITY** for the theory of the way in which the electro-motive force is generated, measured, and used. We now proceed to notice the principal varieties of cells at present in use. We may first describe the construction of the famous Volta pile. A circular plate of zinc, *z* (fig. 4 in Plate), usually about $1\frac{1}{2}$ inch diameter and $\frac{1}{16}$ inch thick, is laid upon a plate of copper, *c*, of equal diameter; and any convenient number of these are placed above one another, with the copper side undermost in all: between every two compound plates is a circular piece of paper or pad of cloth moistened with diluted sulphuric acid; and the whole column or pile is generally made to preserve a vertical position. The paper or cloth should be rather less in diameter than the plates of metal; and no moisture should be allowed to escape over the edges of the plates.

Such a pile, if it contain a large number of elements, will give a perceptible shock if the opposite ends, or wires coming from them are touched simultaneously. The opposite extremities of the pile, or the wires which are in contact with them, are called the poles of the battery. The zinc end, at the top, is called the positive pole; and the copper, at the lower extremity, the negative pole. The outer plates of copper and zinc which are not in contact with any liquid act merely as conductors, and may be omitted without detriment, in which case the copper becomes the positive and the zinc the negative pole of the battery, as in the cell already described.

A similar but improved construction is the *dry pile* of Zamboni, which consists of a number of paper discs coated with zinc-foil on one side and binoxide of manganese on the other, piled up in the same way as *Volta's pile*, but to the number of some thousands, and contained in a glass tube of the same circumference. The conductor is only the slight moisture of the paper, and therefore the resistance is enormous; but the electro-motive force is so great as to give a spark, and a considerable shock. It is a very durable construction; and as a proof of this it may be mentioned that in the Clarendon Laboratory at Oxford a Zamboni pile has been ringing a little pair of electric bells by the oscillation of a clapper between them (alternating between the bells, which are at the poles of the pile, and striking first one and then the other) for over forty-five years, without an instant's cessation, and it will continue its work till the zinc is all oxidized.

A good voltaic battery should fulfil all or most of the following conditions. Its electro-motive force should be high and constant; its internal resistance should be small; its current should be constant; it should be free from polarization; it should be durable, not requiring too frequent renewal of acid; it should be cheap and of durable materials; and manageable, free from corrosive fumes and other unpleasantnesses. No form of cell fulfils all these conditions, therefore some forms are better than others for special work. If telegraphing through a long circuit be desired, internal resistance may be considerable; on the other hand, if lighting be the object, internal resistance must be at a minimum.

The greatest difficulty arises from the *polarization* of voltaic cells, which occurs in this manner. Most varieties of cell depend for their operation on the liberation of free hydrogen, which generally collects on the copper surface. Now hydrogen is very strongly positive, and therefore a film of it covering the negative plate actually sets up a reverse current. If the proper current of one of those cells which suffer from this defect be suddenly checked, a considerable reverse current is found to have been established—this *secondary current* flowing through the acid from copper (that is, from the film of hydrogen covering the copper) to zinc instead of the direction of the true current, which is from zinc to copper. Acting on this discovery Ritter, Planté,

and Faure have constructed each a different form of *secondary batteries or accumulators*. Ritter (1803) used electrodes of platinum. Planté (1860) rolled up two sheets of lead separated by thin canvas, or by india-rubber bands, into a cylinder, and immersed them in dilute sulphuric acid, using the two sheets as two electrodes or plates, and charging them frequently and alternately—that is, first making plate No. 1 the positive and plate No. 2 the negative electrode, and then reversing this, and continuing to reverse the current in this manner till the chemical action of the dilute acid, stimulated by the passage of the current, had partly decomposed the surfaces of both the sheets of lead. If a powerful current is now sent through it by a dynamo-machine, oxygen is given off at one plate, forming a thicker coating of oxide of lead, while the oxide is partially reduced on the other plate. The two plates now form a galvanic couple, and will yield a current of electricity in the reverse direction to that used in charging the battery. Faure, in 1881, still further facilitated the operation of putting the battery in working condition by coating the plates with red lead, and packed them up in a box in a convenient form. They may be rolled up as shown in our Plate, fig. 5, and immersed in a cylindrical vessel, or flat plates may be used separated by flannel or felt. The alternate plates are connected as in an ordinary galvanic battery, and the whole immersed in dilute acid. The coating of red lead being readily acted on by the current greatly reduces the time required to get the battery into working order.

In this manner "out of evil has come good," but what makes the power of the *Faure accumulator*—namely, the polarization of the electrodes—is a serious drawback to the efficiency of the voltaic cell. The film of hydrogen at the polarized negative plate has also another result beyond the production of a secondary current in a reverse direction, for it acts mechanically against the primary current, resisting its passage by interposing itself in its path, all gases being bad conductors of electricity. Many schemes have been devised to get rid of this dangerous enemy. If the bubbles of gas could be brushed away as they accumulate, or oxidized (and converted into water, H_2O) by a stream of oxygen or even of air blown upon them, or disturbed by the agitation of currents in the water, polarization would be prevented. *Smee's battery* (fig. 6) provides another means, for as it consists of a zinc and of a platinumized silver plate, in dilute sulphuric acid, the finely divided platinum on the negative plate gives up the hydrogen freely from its numerous points, and it rises through the liquid and escapes.

A still better contrivance is that which chemically absorbs the hydrogen as it is formed. Such a result might be gained by bichromate of potash, nitric acid, or chloride of lime, but copper must not be used in such a battery, since these substances would attack it. One of the best of such cells is the *bichromate battery* of Poggendorff (fig. 7 in Plate), where, in a bottle-shaped vessel with a spherical body and a cylindrical neck, a little bichromate of potash is added to the usual acidulated water. A plate of zinc is the negative pole, and a pair of carbon plates, one on each side of it, are joined together at the top to make a positive pole. A simple arrangement allows the zinc to be drawn upwards out of the way of corrosion into the cylindrical neck of the bottle when the cell is not being worked. This is a very favourite battery with amateurs, though slightly more expensive than the ordinary acid batteries, because it is so cleanly, so easily set in working order, and so easily put out of gear when done with; avoiding all the rinsing and unpleasant odours to which taking down acid batteries submits the operator, in addition to the very probable accidents from spilt acid.

Complete depolarization is only effected, however, in two-fluid cells. Of these one of the oldest is *Daniell's battery*, the outer cell of which is of copper, and is filled with a

saturated solution of blue vitriol, crystals of which are heaped on a perforated cover at the top to maintain the strength of the solution, as it is weakened by the working of the battery. The inner cell is of unglazed porous earthenware, and is filled with dilute sulphuric acid in which hangs a rod of zinc. The latter dissolves in the dilute acid, forming sulphate of zinc and liberating hydrogen, which, passing through the porous cell, is absorbed by the sulphate of copper (blue vitriol) to form sulphuric acid, and pure copper is liberated on the inner surface of the outer (copper) cell. The thickness of the zinc plate decreases by the working of the cell, while that of the copper cell-wall increases. The battery has, therefore, practically no polarization, and gives a very steady current (though not a powerful one, because of the very high resistance in this form of cell), and is very valuable, on account of this steadiness, in testing the strength of other and more variable batteries. This form of the cell is represented in our Plate, fig. 8, in section. Its regular action causes it to be a favourite battery for telegraphic purposes. It is often made into a *sandust battery*, its cells being choked with sawdust to render them portable.

Grove's battery (fig. 9) is far more powerful than Daniell's, having less internal resistance and a greater electro-motive force (and either of these causes increases the strength of the current). The cell or "element" of the Grove's battery is composed of an outer cell of glass, or glazed earthenware, or ebonite, containing dilute sulphuric acid, in which rests the zinc plate. The lower end of this is curved upwards, both to give a larger surface to the acid and to wrap round the inner cell on both sides, for the latter is placed within its curve. The inner cell is of porous earthenware, and its plate is of platinum-foil, dipping into strong nitric acid. The hydrogen, liberated from the water by the formation of sulphate of zinc in the outer cell, in the same manner as previously described, here passes through the porous substance of the inner cell into the nitric acid, and is at once absorbed in the production of nitric peroxide, which in its turn is dissolved immediately by the nitric acid; therefore polarization may be said, in this excellent cell, to be quite annulled, and the current continues with great strength for several hours. One cell will drive a small magneto-electric engine, or raise 2 or 3 inches of thin platinum wire to a red heat. Fifteen such quart cells will produce an incandescent electric light of 25 candle power, or an arc-light of incomparably greater brilliance.

In *Bunsen's battery* (fig. 10) slabs of gas carbon (the refuse of gas manufacture) are used instead of the expensive platinum-foil of the Grove's cell, but it is more difficult to work successfully; and although the first cost is much less, the working is more expensive. However, this is at present the favourite form of battery for ordinary purposes. It is less powerful than the Grove.

Niandet's battery places the zinc in brine and the carbon in chloride of lime solution; the latter readily yielding enough oxygen (and chlorine also) to neutralize the hydrogen film.

Leclanché's battery (fig. 11) is a favourite one amongst telephone and telegraph operators. The dilute sulphuric acid of the Grove's cell is here replaced by a solution of sal-ammoniac, the hydrogen and ammonia which are yielded from the solution by the eating away of the zinc and the formation of chloride of zinc (at the expense of the chlorine of the sal-ammoniac) being both of them neutralized by the powdered carbon and binoxide of manganese contained in the porous inner cell. This battery quickly loses its depolarizing power, which is slow though continuous, and it cannot therefore be worked for many minutes at a time; a short repose soon restores its efficiency. It needs no other attention for years. If the binoxide of manganese be plastered over a carbon plate the inner cell is not needed.

Marie Dary's battery has sulphate of zinc in the outer cell, and a carbon plate dipping in mercurous sulphate in solution forms the inner cell, so that mercury is deposited on the carbon when the current is in action. It is very permanent, but is considerably less powerful than the Leclanché. Another mercury battery is the *standard cell* of Latimer Clark, so called because its almost perfect steadiness has superseded the Daniell as a standard in cases requiring great accuracy. Mercury here acts, through a platinum wire dipping into it, as the positive pole, and the negative pole is a plate of zinc resting on mercurous sulphate in a paste, this in its turn floating on the mercury.

Finally, from the numerous other forms of battery existing, we select for description *De la Rue's chloride of silver battery*, of which a splendid example, consisting of 14,400 cells, was exhibited in 1881 at the Royal Institution of Great Britain. The chief peculiarity of this battery is that it is a solid substance—chloride of silver—which takes the place of the sulphate of copper solution of the Daniell. It is used in connection with a rod of zinc, the two elements—the chloride of silver and the zinc—being immersed (hanging parallel to each other) in a glass jar or cell containing a weak solution of chloride of ammonium or chloride of sodium. (See Plate, fig. 12.) The chloride of silver is ordinarily quite insoluble in this liquid. When the connection between the two elements is not closed into a circuit no action whatever takes place, but as soon as the circuit is closed the zinc dissolves, and the chloride of silver parts slowly with its chlorine, and in doing so is changed into the state of a porous mass of reduced silver, setting free a current of voltaic electricity so long as the decomposition is in progress. The battery has the very great recommendation that, although it dispenses with the porous jar and the two different kinds of liquid, it is, nevertheless, remarkably constant and durable in its action, working for several years without any attention whatever; and although the silver element is costly in the first instance, where a large battery is concerned, nearly the whole of the silver can be recovered after the exhaustion of the battery. Dr. De la Rue found that the actual loss of silver with good management does not necessarily amount to more than $1\frac{1}{2}$ per cent. There are 200 grains of the chloride in each cell, which is worth about 2s., including the cost of fusing it and casting it into the form in which it is employed. The cost of the silver employed in the large battery at the Royal Institution was about £1430. The cell of the battery is closed at the mouth by a plug or stopper of paraffin. The silver element is formed of a solid rod of fused chloride of silver, cast round a thin flat wire or ribbon of pure silver by pouring it in a molten state into a mould, in which the pure silver core has been previously fixed. The silver core projects through the bottom of the rod to establish a free contact with the liquid, and it is carried upwards between the glass neck of the jar and the paraffin stopper. The chloride of silver rod is a little more than 2 inches long and a quarter of an inch thick. It very much resembles a stick of lunar caustic, but when cold it is so tough that it does not readily crumble, and is yet so soft that it can be cut with a knife.

Twenty cells of this very compact and handy battery proved to be sufficient to fire the ordinary blasting fuse. One hundred cells gave a brilliant arc, sustained between charcoal points, when drawn the sixteenth part of an inch asunder. Two hundred cells gave a luminous arc between charcoal points a quarter of an inch asunder; 11,000 cells gave a spark sixty-two hundredths of an inch long; and the 14,400 cells, which were coupled up together for the first time at the Royal Institution, gave a spark seven-tenths of an inch long, and which struck at once that distance from terminal to terminal without any previous establishment of contact and subsequent withdrawal.

Dr. De la Rue's intention was to exhibit the full power of the battery in connection with the large condenser at the

Royal Institution, but it was found to be impossible to do this because the plates of the condenser were immediately broken by the flashing of the discharge through the glass. Not more than 3,240 of the cells of the battery could be used with the condenser. With these, however, the discharge was strong enough to deflagrate $2\frac{3}{4}$ inches of gold wire the eightieth part of an inch in diameter with a loud report, merely leaving a stain of metallic dust scattered upon the glass on which the wire had been stretched. Dr. De la Rue calculated that in order to get an electrical flash equivalent to a discharge of lightning a mile long, it would be necessary to have at command a battery 243 times more powerful than the one with 14,400 cells. This would be represented by about 3,500,000 cells.

With this exceedingly powerful battery a beautiful imitation of the *AURORA BOREALIS*, of striking accuracy, was produced in a large vacuum tube, coloured streamers flashing out into the tube in radiating lines in the manner so well known in the natural phenomenon.

We append a table of the electro-motive force of each of the varieties of cell described above, cautioning the reader, however, that the E.M.F. (electro-motive force) does not give the "strength of current," which is profoundly affected not only by resistance of the external wire or other conductor forming the circuit, but also by the internal resistance of the cells. This varies with the thickness of the liquid in the path of the current, the size of the cell, the conductivity of the liquid, &c. Strength of current, in fact, can be increased as well by lessening the internal resistance as by increasing the E.M.F.

Volta's battery has an E.M.F. of 0.82 volts.

Sincc's	"	0.65	"
Daniell's	"	1	"
Grove's	"	1.78	"
Bunsen's	"	1.75	"
Niandet's	"	1.65	"
Leclanché's	"	1.50	"
Marie Davy's	"	1.52	"
Latimer Clark's	"	1.45	"
De la Rue's	"	1.03	"

so that the E.M.F. of the great battery of the Royal Institution (of 14,400 cells of the last-named form) was in all 14,832 volts.

BATTICALOA, an island situated near the entrance of an inlet of the sea, on the east coast of Ceylon, $7^{\circ} 44'$ N. lat., $81^{\circ} 52'$ E. lon. It contains a small fort and garrison, and is the head station of the assistant government agent of the district of Batticaloa. Batticaloa is also the name of a district of Ceylon, which contains an area of 13,060 square miles, and a population of about 30,000.

BATTLE or **BATTLE ABBEY**, a town in Sussex, 23 miles S. of Tunbridge Wells, 7 miles N. of Hastings, and 68 miles from London by the South-eastern Railway. The parish church, a transitional Norman building, restored in 1868, contains some good monuments. The town is pleasantly situated amidst woody knolls, which bound it on the S. and S.E., and inclose it in a vale which winds on to the sea at Hastings. The principal street (about half a mile in length) is terminated by the magnificent gateway of the old abbey. Gunpowder is the only manufacture, for which there are several extensive mills in the vicinity. Battle Abbey was founded by William the Conqueror in commemoration of the victory which gave him the English crown. He richly endowed it, and dedicated it to St. Martin. Its consecration took place on the 11th of February, 1094. On the completion of its church he deposited in it the famous roll in which the names of all the leaders who had accompanied him on the expedition were inscribed. Copies of it are still extant, though not free from the suspicion of interpolations and falsifications. Benedictine monks from Normandy were its first occupants;

their abbot was mitred, and a peer of Parliament. The abbey was built on a gentle acclivity, overlooking a fine extent of woods and meadows, and was endowed with all the lands for a league round, besides various manors and churches in other counties. Many subsequent royal and private donations were added to the original endowment, and its prerogatives and immunities were placed on the same footing as those of Christ Church, Canterbury. In the reign of Edward III. leave was obtained to fortify the abbey. At the general suppression its annual revenue was, according to Speed, £987; Dugdale makes it £880. Sixty monks were pensioned off. The ruins, now the property of the Duke of Cleveland, consist of the gate-house, hall, almonry, a portion of the old cloisters, the refectory, and remains of the church. The battle-field, on which the crown of England was lost and won, may still be traced with interest by the historical student. He may note the little rivulet—

"Asten, once distained with native English blood,
Whose soil yet, when but wet with any little rain,
Doth blush, as put in mind of those there sadly slain."

Telham Hill, where the Norman standard was raised, is locally called Tellman Hill. The Saxon camp stood on the rising-ground now occupied by the abbey. It was protected by deep dykes, and by a breastwork of stakes and hurdles. "Had it been held with the same enduring coolness as the lines of Torres Vedras or the slopes of Waterloo, the Normans would have fallen back dispirited and starved." It was the impetuous courage of Harold's soldiers that gave the victory to their foes. The population in 1881 was 3319.

BATTLE, WAGER OF. See APPEAL.

BATTLE-AXE, a military weapon of offence used in different countries from the remotest times. The two Greek names for the battle-axe, *axinë* and *pelekus*, occur in Homer in the same verse (Iliad, O. l. 711). It seems probable that the *axinë* was similar to our hatchet, while the *pelekus*, which is usually translated in Latin by *bipennis*, had evidently two heads or edges. In the Roman armies we do not find the battle-axe in ordinary use. It seems to have been considered as the weapon more peculiarly used by uncivilized nations. The general Roman name was *securis*.

The introduction of the battle-axe into this country has been attributed to the Danes; but proofs of an earlier use of it in our islands are deducible. That it was used in England in the Saxon times appears from several MSS. of the ninth century; and the English are represented as using it in the Bayeux tapestry. The pole-axe, with an edge on one side and a sharp point on the other, is believed to have come in with the Normans.

During the middle period of English history we read but little of this weapon, though it appears to have been constantly used. The Welsh infantry used it with great effect at the battle of Agincourt. Towards the close of the sixteenth century the battle-axe seems to have fallen into gradual disuse, although the occasional placing of a pistol in its handle indicates a wish on the part of the warriors of that period that it should be retained. It was early used in naval warfare, especially for cutting the ropes and rigging of vessels. Several specimens of different forms of battle-axe are given in Grose's "Military Antiquities," and Sir Samuel Meyrick's "Illustrations."

BATTLEMENT, a parapet wall, commonly employed in castellated and in ecclesiastical edifices of that kind which are distinguished by the general name of Gothic. [See *GOthic ARCHITECTURE*.] The battlement is of very remote antiquity, as it appears in the ruins of the ancient monuments of Greece and Italy. The modern battlement, however, is better known as belonging to buildings from the eleventh to the end of the sixteenth century. It was originally designed for the protection of the besieged, but afterwards became merely an ornament to the edifice.

Battlements were not in general use in ecclesiastical edifices until the middle of the twelfth century.

The battlement is generally indented with a coping sloping both ways from about the centre; the lower part between the coping and the cornice of the building is often pierced and decorated. As to *Norman battlements*, it is very difficult to ascertain what was their precise form. Probably they were only plain parapets, but there are instances in some castellated Norman buildings of a parapet, with here and there a narrow interval cut in it. In *Early English battlements* the parapet was seldom indented, and in many buildings it was plain; in others, however, decorated. At Salisbury it is executed with a series of arches and panels.



Trefoiled
arches and
corbels under
battlement.

From Salisbury Cathedral.

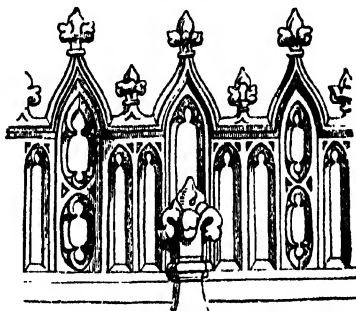
Decorated English Battlements.—During this period the parapet wall without indentations continued frequently to be used; but it is often pierced through in various forms, generally consisting of quatrefoils, and quatrefoils in circles. Another form, however, which is not so common, may be considered more beautiful. This is a waved



From Mary Magdalene Church, Oxford.

line, the spaces of which are trefoiled. In St. Mary Magdalene Church, at Oxford, there is a good example of this kind of battlement.

Perpendicular English Battlements.—In the battlements belonging to this period, parapets without indentures still continued to be used occasionally. The serpentine

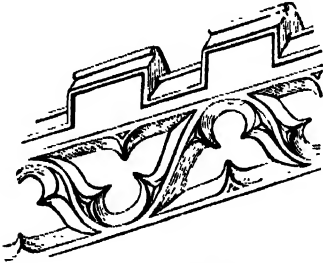


From the Tower of Lincoln Cathedral.

line with the trefoil was also still in use, but the line dividing the trefoil was more frequently made straight, and the divisions were consequently formed into triangular panels. But in the early and best works the trefoils are not divided by straight lines. There are many varieties

of pierced battlements belonging to this period. A few edifices of a later period have pierced battlements ornamented with pointed compartments, as in the tower of Lincoln Cathedral.

Castellated battlements have the embrasures between the battlements sometimes nearly equal to the width of the battlements themselves; sometimes the embrasures are narrow, and the battlements wide, with the coping moulding placed horizontally and the sides cut plain. Another battlement consists of a moulding running round the



From York Minster.

battlement and the embrasure, while a capping is set upon the horizontal part of the embrasure and battlement, as at York Minster.

BAUGÉ, a town of France, in the department of Maine-et-Loire, 23 miles E.N.E. from Angers. The town is agreeably situated in a fine valley, and has some good houses, but it is built with great irregularity. It has some manufactures of cloth and coarse linen. The English forces, under the Duke of Clarence, were totally defeated in the neighbourhood of this town in 1421, and the duke killed. The population of Baugé in 1882 was 3280.

BAUHINIA, a genus of plants belonging to the order LECUMNOSÆ. Linnaeus applied the name to commemorate the merits of the two Bauhins. The genus is remarkable for its leaves being generally divided into two twin lobes.

The species are usually twining plants, found in the woods of hot countries, and often stretching from tree to tree like living cables. *Bauhinia Vallii* of Northern India is a shrub, the branches of which climb over the highest trees, some of them being from 100 to 300 feet long. The ropes made from the fibres are used for suspension bridges over the Himalayan torrents. The seeds are eaten by the natives. *Bauhinia scandens* is a climber of Southern India. A line made from its fibre has sustained a weight of 168 lbs. for forty-five minutes. Some of the species are small trees, as for example the Asiatic *Bauhinia variegata*, which is naturalized in Jamaica, and is called there "mountain ebony," because its wood is sheathed with black. Their flowers are often very beautiful.

BAUME-LES-DAMES, a town of France, in the department of Doubs, 18 miles from Besançon, is situated on the river Doubs. It is a handsome little town, finely situated in a basin formed by hills planted with vines; has paper-mills and tanneries. It derives its name from a rich and celebrated convent for nuns, founded in it during the fifth century, and destroyed at the Revolution. Near the town are five peaks of the Jura, on one of which is a ruined castle of the dukes of Burgundy, destroyed in 1476. The population in 1882 was 2800. Large quantities of gypsum are quarried near the town.

BAUR, FERDINAND CHRISTIAN, a distinguished critical writer and divine of Germany, was born at Schneiden 21st July, 1792. The usual course of education being completed, his acute mind and singular erudition soon raised him to the professorate. After occupying a chair in one of the inferior universities he was translated to Tübingen in 1826, where he founded a new theological school, commonly named the Tübingen school. The disciples of

Baur have, as has often happened, outdone him; and Schwegler and others would step boldly in where the more erudite and cautious Coryphæus would fear to tread. The works of the Tübingen school have advocated a destructive criticism which would sadly mangle the Scriptures, and leave us but a few disjointed fragments. Baur's works are of various kinds. There are his critical works, in which he applies his peculiar principles to the New Testament, as in his "Paulus der Apostel" (1845) and his "Reputed Epistles of Paul," where he labours to prove that the Epistles to Timothy and Titus were not written by Paul, chiefly because of allusions which belong to the Gnostic philosophy of a later period, and he holds that they were written during the Marcionite heresy; his "Kritische Untersuchungen über die canonischen Evang." (1847), wherein he proved clearly for the first time what is now universally admitted, that St. John's Gospel is considerably later than the Synoptics; and his "Das Marcus-evangelium" (St. Mark's Gospel), 1851, &c. Another class of his works exhibited his devotion to the Hegelian philosophy, as his "Symbolik und Mythologie," an early work (1824); "Das Manichäische Religions-system" (1831). Another and far more important section of his writings is that which treats critically and historically of certain doctrines. To this class belong his "Geschichte der Vernehmlichungs-lehre," &c. (History of the Doctrine of the Atonement), and his Doctrine of the Trinity and Incarnation—"Lehre von der Dreieinigkeit und Menschwerdung Gottes" (three vols.) These treatises are distinguished by a rare subtlety and learning, and by a peculiar facility in defining and developing the opinions of others who have written on the subject discussed. Baur had a special aptitude for this difficult work of representation, seizing on the various shades of opinion, bringing out its delicate modifications, and reproducing in vivid and impartial form the belief and theology of various ages of the church, whether these be primitive, mediæval, or modern, or are marked by scholastic refinement or metaphysical distinctions. For example, in reference to the Atonement, it is described as the Apologists taught it, as Anselm viewed it, as the English divines portrayed it, as Luther preached it, as Calvin delineated it, and as Schleiermacher depicted it, with multitudes of others, through all the grades of opinion which have been promulgated for eighteen centuries. The work which is best known to ordinary English readers, however, is his "Church History of the First Three Centuries," excellently translated by M. Menzies in 1879. The succeeding posthumous volumes of the "Church from the Third to the Sixth Century" (1863), and the "Church of the Middle Ages" (1869), are not so well known in England, as they still wait translation. They are almost as fine as the masterpiece alluded to above. F. Baur edited these remains of his father, as well as a further treatise bringing the history up from the Reformation to the present century, and a sketch of the "Church in the Nineteenth Century." The "Paul the Apostle" was also translated into English by Menzies in 1876. The influence of Baur has been great in Germany, and his penetration, honesty, industry, and acquirements are universally acknowledged. He died December, 1860.

BAUTZEN or **BU'DISSIN** (in the Wend language *Budishyn*, which is equivalent to "town"), the capital of Saxon Upper Lusatia, stands on a hill above the Spree, 35 miles E.N.E. from Dresden, and had a population of 17,800 in 1882. It is the seat of a Catholic bishop, and contains government offices, a consistory, and other public establishments. The town is handsome and well built, and contains amongst its public structures a cathedral, which is shared between Catholics and Protestants, their respective portions being separated by a screen of trellis-work. There are five other churches in the town, a handsome town-house, and an old castle, formerly the residence of the margraves of Meissen. The town also possesses a

gymnasium, a training-school for schoolmasters, and a public library. It has considerable woollen, linen, and cotton manufactures; hosiery, gunpowder, paper, beer, &c., are also made. Here, on 21st May, 1813, Napoleon won a barren victory over the Russian and Prussian armies, after a protracted struggle, in which the French lost 5000 killed and 20,000 wounded, and the allies 15,000 killed and wounded, and 1500 prisoners. Duroc, the intimate friend of Napoleon, was killed by his side in this engagement. About 7 miles E. by S. from Bautzen is Hochkirch, the scene of one of the great battles of the Seven Years' War.

BAVARIA, KINGDOM OF, derives its origin from one of the most ancient duchies in modern Europe. The name appears to come from the Boii or Boiarii, its early inhabitants, and the appellation is retained in the modern German name of *Bayern*. Above seven-eighths of the territories which compose Bavaria lie in the south of Germany, east of the Rhine, and form a compact state, which extends from 47° 19' to 50° 41' N. lat., and from 8° 51' to 13° 41' E. lon. Its circuit, taken in straight lines, is estimated at nearly 1130 miles, but followed out in all its curvatures, at upwards of 1530. This portion of the Bavarian dominions, in which seven out of the eight provinces are comprised, is bounded on the S. by the Tyrol, S.E. by Austria, N.E. by Bohemia and Saxony, N. and N.W. by Rhenish Saxony, Hesse, Hesse-Darmstadt, and Baden, until its borders reach the Tauber at Mergentheim, whence the whole boundary to its south-western point on Lake Constance is formed by the kingdom of Würtemberg. The other portion of the Bavarian dominions, the "Palatinate of the Rhine," is situated in an angle between Alsace-Lorraine and the left bank of the Rhine. It is completely disjoined from the preceding by the interposition of the Baden and Hesse possessions, and extends from 48° 57' to 49° 50' N. lat., and from 7° 6' to 8° 31' E. lon.

The kingdom of Bavaria is divided into eight provinces; the extent in square miles and the population in 1880 were as follow:—

Circles.	Area. Sq. Miles	Population.	Chief Cities.
Upper Bavaria, .	6,611	951,977	Munich.
Lower Bavaria, .	4,113	646,947	Landshut.
Upper Palatinate and Ratisbon, .	4,198	528,564	Regensburg
Upper Franconia, .	2,226	575,357	Baireuth.
Middle Franconia	2,798	643,817	Augsbach.
Lower Franconia	3,331	626,305	Wurzburg.
Aschaffenburg,	3,858	631,530	Augsburg.
Swabia,	3,858	631,530	Augsburg.
Palatinate of the Rhine, }	2,206	677,281	Spire.
Total,	29,347	5,284,778	

Physical Description.—Bavaria is on the whole a mountainous country, and in the valleys between the ranges are many swamps or morasses. The highlands are offsets from two great masses, the Alps and the Sudete-Hercynian chain. To the former belongs a portion of the Noric Alps; the Arlberg Mountains, which enter the country from the Tyrol and subside there; the Allgau Alps, which commence near Kempten, and extending north-eastward, terminate near Mindelheim. The highlands on the north side of the Danube, beginning at the northern part of the kingdom, contain the Spessart Mountains, a finely wooded chain, separated from the Odenwald by the Main. The Steigerwald, a forest range of inferior altitude, extends south of the Main, along the borders of the circles of the Lower and Upper Main and the Rezat, and affords

a picturesque alternation of woods and fruitful valleys. The Rhöngebirge, a bleak and desolate chain of mountains, with flattened summits covered almost half the year with snow, lie in the circle of the Lower Main, to the north of the river Main. They are attached on the east to the Fichtelgebirge, and on the west border on the Spessart; they attain their highest elevation in the Kreuzberg, which is 4162 feet above the level of the sea. The Fichtelgebirge, which is connected with the Bohemian forest chain, lies in the north-eastern circle of the Upper Main. Of the Thüringerwald, or forest of Thuringen, an inconsiderable portion lies within the province of the Upper Main, where it is known as the forest of Franconia (Frankenwald). On the west of the Rhine, a branch of the Jura, the "Vosgesus Mons," which loses the name of the "Vosges" on entering Rhenish Bavaria, where it is Germanized into the Wasgau, stretches in a north-easterly line deep into the centre of that province, and terminates in the canton of Kirchheim, in which is situated its loftiest summit, the Königsstuhl, one of the group of the Donnersberg (Mountain of Thunder), 2142 feet high. The composition of this chain is chiefly old red sandstone, though in some parts, particularly on the Donnersberg, which is crowned with a plateau above 100 acres in extent, it contains hornblende and porphyry. In the Bavarian highlands there are few peaks exceeding 8000 feet in height, and the ranges in the north seldom exceed from 3000 to 4000 feet.

The Rhine forms the eastern boundary of the Rhenish subdivision of Bavaria, from a point north-east of Lauterburg to a point a little south of Worms; the principal streams which fall into it on the Bavarian side are the Lauter, below Lauterburg, the Klingbach, south of Sondernheim, the Queich, close to Gernersheim, and the Speier, near the town of Speier, or Spire. The breadth of the Rhine above Lauterburg is 1400 feet; its fall in this part of its course is estimated at 4½ feet in every 3½ miles, and it flows at the rate of about 395 feet per minute.

The Danube forms the boundary of Bavaria and Würtemberg for about 2 miles south of Ulm, and from Ulm passes through Bavaria by way of Donauwörth, Ingoldstadt, Regensburg (Ratisbon), and Passau. The chief streams which fall into it are the Iller, the Leiba, Mindel, Zusam, Lech, Isar, Inn, Würnitz, Altmühl, Rohrbach, Sulz, Naab, and Regen.

The Main or Mayn is formed by two small streams which join at Steinhausen below Kulmbach; it flows near Bamberg, Schweinfurth, and Würzburg, to Aschaffenburg, whence it passes into Hesse. The Rodach, the Lauter, the Itz, the Bannach, and the Regnitz are affluents of the Main. The Danube, Main, and Inn are all navigable in their entire courses in Bavaria, and greatly facilitate the trade of the country. The principal canal in the kingdom is the Ludwigs Canal, uniting the Rhine with the Danube, and so connecting the German Ocean with the Black Sea.

On the Boden See (Lake Constance) are situated the harbour and fortress of Lindau, the most south-western point in Bavaria, but only a small portion of the surface of this lake belongs to Bavaria. There are, however, numerous other lakes within the Bavarian territory, among which are the Chiem See (Lake Chiem), about 35 miles in circuit; the Würm, or Stahrenberger See, 14 miles in length and about 4 in breadth; the Ammer See, about 12 miles long and 27 in circuit; the Staffen or Staffel See, about 5 or 6 miles in circuit; the Waller or Walchen See (Lacus Wallensis), containing about 13,500 acres; the Koehel See, and a few others. Some of these lakes are as much as 600 feet deep, and contain inhabited islands, and most of them abound in fish.

The climate of Bavaria is, on the whole, temperate and healthy. It is cold and bleak in the mountainous districts, but milder in the plains and valleys through which the Main, Altmühl, and Regnitz flow, particularly in the parts

adjacent to the first of those streams, where the Thuringian and other mountains shelter them from north winds. The Rhenish possessions have a climate as mild and salubrious as the country traversed by the Main, except in some districts of the west, which are intersected by the Vosges and their branches; here winter still prevails, while flowers and fruit-trees are blossoming in the rich and sunny plains.

Vegetable Productions.—Few countries possess a more productive soil than Bavaria, which was formerly turned to little account, but a great advance in cultivation has been made in recent years. Agricultural industry is principally directed to the cultivation of wheat, rye, barley, and oats; the produce, however, varies considerably both in quality and quantity, so much so indeed with respect to the latter as to range from threefold to twofold; on the average it may be estimated at about 6 bushels per English acre. In some districts rice, spelt, maize, and buckwheat are cultivated, but there are parts in the neighbourhood of the Spessart where the climate and soil are unfavourable to the growth of almost every kind of corn-seed. The grape is much cultivated in warm situations, especially the Franconian, the Steinwein, and the Leistenwein varieties. Among other articles of Bavarian vegetable produce are hops, tobacco, flax, hemp, linseed, rapeseed, mulberry-trees for silk rearing, fruits of many kinds, cowslip and other seeds, madder, the potato, and cattle fodder. The land is much subdivided, and held in small portions.

The proportion of soil occupied by woods and forests, as compared with the surface occupied by arable land, is nearly 60 of the former to 100 of the latter. Most of the mountains in Bavaria are finely wooded; many of the more extensive plains also contain forests. Those of the Spessart and Rhön mountains, in the province of the Lower Main, may be considered as the most valuable; the oak obtained from the Spessart is highly esteemed, and is exported to a large extent, but the beech of the Rhön is very little inferior to it in strength. The juniper, the fir, and the pine are the other chief kinds. The firewood produced by these forests is largely exported; and the forests also yield tar, turpentine, and juniper berries. Nearly a third of the forests of Bavaria are public property, and yield a considerable revenue to the state.

Animals.—According to the latest returns, Bavaria had upwards of 3,000,000 horned cattle, 2,000,000 sheep, and a third of a million horses. The dairy produce is extensive, and cheese is largely exported. Swine are reared in all quarters, but more particularly in the neighbourhood of the Spessart and Rhön mountains, where acorns are abundant. Of goats the stock is not large, and few mules or asses are bred. Oxen are much used in agricultural operations instead of horses. Fowl, both wild and domestic, are plentiful; the rearing of bees has been neglected until of late years. The lakes and rivers of Bavaria abound with fish; in the circle of the Isar especially, where the largest inland waters exist, and along the banks of the Main and Rhine, thousands derive a comfortable livelihood from the fisheries. The most noted species are the salmon of the Rhine, the trout of the Franconian streams, and the crayfish of the Altmühl.

Minerals.—The principal mineral products are iron, coal, and salt; quicksilver is found in the circle of the Rhine, and copper, which was formerly raised in several quarters, is now confined to the works at Kahl and Karlsdorf, in the circle of the Upper Main. There are two mines of cobalt also on the latter spot, from which small quantities of tin, lead, and antimony have occasionally been obtained. The Upper Main, Rhenish Bavaria, Regon, Lower Danube, and Isar territories are the chief mining districts in Bavaria. Among the other mineral produce may be named black-lead, sulphur, porcelain clay (amongst the finest in Europe), lithographic stones, marble, alabaster, rock crystal, asbestos, and many of the gems.

Manufactures and Trade.—Bavaria is essentially an agricultural country, and until 1868 restrictions were often imposed on manufactures by the various guilds. Since their removal, trade and manufactures have considerably increased. The manufacture of woollens and worsted hose is carried on principally at Augsburg. The leather manufactures are of considerable importance. Bavarian calf-skins are in great repute and largely exported. The supply of paper, of which Aschaffenburg, Nürnberg, Plüth, Augsburg, and Schwabach furnish many fancy sorts, is far beyond the domestic consumption. Schweinfurt and Mainberg possess large manufactures of paper-hangings, which are of excellent quality, and in much demand. Straw-plaiting has increased considerably of late years. The manufacture of looking-glasses and of glass for optical purposes is in a high state of efficiency in Bavaria, and the glass manufactures generally are very extensive. The manufacture of articles in wood, and the felling, hewing, and sawing of timber, occupy thousands of hands. There are nearly 2000 saw-mills for the preparation of boards, deals, and laths; and very many families are wholly supported in Ammergau and Berchtesgaden by the manufacture of articles in carved wood, some of which are very beautiful. There are several porcelain manufactories; that at Nymphenburg, not far from Munich, produces China which bears comparison with the finest in Europe. The potteries and the slate-works are numerous. The working of the metals chiefly consists in extensive manufactories of iron-ware, especially nails and needles, the export of which is considerable. The principal hardware manufacturing centres are Nuremberg and Munich. The salt-works of Bavaria also give employment to many persons; but the brewing of beer, in many respects the most important branch of manufacture in Bavaria, employs upwards of 5000 establishments, or taxed brewers, by whom more than 150,000,000 gallons of beer are made annually. The Bavarians, far beyond any other German people, are addicted to the beer-drinking habit. Inordinate quantities are taken daily by all classes. The state derives a large portion of its revenue from this propensity. "Listen," says a recent visitor to the country, "to the conversation of Bavarians; it turns on beer. See to what the thoughts of the exile recur, to the beer of his country. Sit down in a coffee-house or eating house, and the waiter brings you beer unorderly, and when you have emptied your glass replenishes it without a summons. Tell a doctor the climate of Munich does not agree with you, and he will ask if you drink enough beer. Arrive at a place before the steamer or train is due, and you are told you have so long to drink beer. Go to balls and you find that it replaces champagne with the rich, and dancing with the poor. I went to a servants' ball and stayed there some time, but when I came away dancing had not begun, and all the society was sitting as still as ever drinking beer."

Though Bavaria is an inland country its trade is greatly favoured by its geographical position, which has rendered it in some degree a central point between the Mediterranean, the Baltic, and the German Ocean, and a medium of intercourse between the west and east of Europe. This advantage is increased by its natural productiveness, and by the navigable lines of the Danube, Rhine, Main, and other streams, over which above 1600 larger or smaller bridges have been thrown, as well as by the constant attention which the government has paid to the maintenance and multiplication of public roads and railways, which latter connect all the leading towns with each other and with neighbouring countries. The treaties which have thrown the markets of many neighbouring states open to the industry and enterprise of the Bavarians, have also given an additional stimulus to their commercial activity. The system of duties has been placed on a liberal footing; great facilities are given to importation, and scarcely any obstacles are thrown in the way of exportation. The

exports are estimated at over £1,500,000 annually, and consist of grain, timber, wine, cattle, salt, hides, wool, hops, fruits, butter, cheese, and glass. The chief imports are cotton, sugar, coffee, and other foreign-grown products and manufactures.

Revenue and Expenditure.—The revenue and expenditure are each somewhat over £11,000,000 per annum. Upwards of £5,000,000 is received from railways, which are the property of the state, and over £1,000,000 from forests. The public debt increased from £33,000,000 in 1872 to £68,000,000 in 1883. More than £32,000,000 has been spent on railways, which entails an annual charge of over £1,800,000; and as the net income from them, after deducting working expenses, does not usually amount to more than about £1,500,000, the deficit has to be made good from other sources of revenue. There is a good system of telegraphs, all of which belong to and are worked by the government.

Religion and Education.—Of the population more than 3,500,000 are Roman Catholics. The "Edict of Religion," of the 16th of May, 1818, does not recognize any predominant national church, but establishes full liberty of conscience, and gives both to Roman Catholic and Protestant an equality of civil rights; the privilege of private worship is secured to individuals of every persuasion, and that of public worship may be granted by the king upon the application of a sufficient number of families. All matters connected with the temporal concerns of religious communities are conducted by the section for ecclesiastical affairs in the home department; but the exercise of judicial power in the Roman Catholic Church, with reference to members of their own body, is intrusted to the archbishops, bishops, abbots, and deacons. The king is the temporal head of that church, and no laws, ordinances, or other public acts relating to it, can be promulgated without the royal sanction.

By the concordat concluded with the Pope on the 5th June, 1817, two archbishoprics, Munich and Bamberg, and six bishoprics, Würzburg, Eichstätt, and Spire, under the former, and Augsburg, Ratisbon, and Passau, under the latter, were instituted. The Roman Catholic Church in Bavaria possesses 171 deaneries and 2756 cures of souls. The revenues arise from estates and endowments. The "Old Catholic" party has made considerable progress in Bavaria, and has congregations in all the chief towns. The Lutheran inhabitants are under the superintendence of consistories. The Protestant clergy are maintained by the state, and public grants are also made to the inferior Roman Catholic clergy.

The Roman Catholics are distinguished, in the rural districts especially, by a profound respect for relics and the devout observance of pilgrimages, for whom the manufacture of sacred images is a flourishing trade in several villages. In the small town of Altötting, near the river Inn, the shrine of the Black Virgin constitutes it the Loretto of Bavaria. The figure, over the high altar in the church, is of undoubted antiquity, eastern origin, and sable complexion. For more than 1000 years devotees have flocked to the sanctuary, and still come annually in crowds, seeking some cure of disease or other benefit from the dark-hued object of their veneration. At Ammergau, towards the frontier of the Tyrol, the dramatic representation of the story of the Passion is a decennial performance. The name of the village refers to its position in the *gau* or valley of the *Ammer*, which descends from the highlands through it to join the Isar on the plains. In 1633, after a famine and pestilence, a portion of the inhabitants made a vow that thenceforth they would perform every tenth year the Passion of Christ in a sacred play; and since that time the pledge has been kept with the slight variation that in 1680 the year was changed so as to accord with the recurring decennial periods of the century. Such

spectacles were common in the middle ages under the name of "mysteries" or "moralities." But the practice has very properly been generally abandoned, and the Ammergau play is now the principal surviving example of it. A theatre with an open roof, erected specially for the performance, accommodates 6000 spectators. The stage scenery and the dresses are the work of the villagers, and the actors, over 400 in number, are all inhabitants of the place. The performance of 1870, interrupted by the Franco-German War, was repeated in 1871, and at that for 1880—when the play was repeated on several successive Sundays—was witnessed by thousands of visitors. All bore testimony to the perfect decorum of the peasantry, performers, and spectators.

The important department of education is under the immediate superintendence of the "Superior Board of Education and Ecclesiastical Affairs" (*Ober-Schul-und-Kirchenrath*), attached to the ministry of home affairs, and under the subordinate direction of the several provincial governments, one member of which has particular charge of all matters connected with scholastic institutions. Subordinate again to the latter are the inspectors of district and local schools—those for the local schools being in general the ministers and elders of parishes. No child is excused attendance at school from six to fourteen years of age, except such as have received permission to pursue their studies under private tutors. There are three universities—two Roman Catholic, at Munich and Würzburg; and one Protestant, at Erlangen. There are also several lycæa and gymnasia, and numerous technical schools, besides academies of arts and sciences, fine arts, horticulture, &c. The largest public library in Bavaria is the Central Library in Munich.

Constitution and Government.—Most of the states of which the kingdom of Bavaria is composed—namely, the former Duchy of Bavaria, the Upper Palatinate, the Duchy of Neuburg and the principalities of Ansbach, Baireuth, Bamberg, and Würzburg—possessed representative constitutions before their consolidation under one head. But the aristocracy in these territories had succeeded in rendering these representative constitutions a dead letter; and in fact they had long been in a state of abeyance previously to being abrogated by the terms of the constitution promulgated by Maximilian Joseph, on the 1st of May, 1808. The convulsions which subsequently affected the whole of Europe rendered this constitution incompatible with the new order of things, and the same king, therefore, on the 26th of May, 1818, granted the Bavarians a new constitution, but various modifications were introduced during the years 1818 and 1849.

The monarchy is hereditary in the male line. The legislature consists of two chambers. The Senators (*Reichsräthe*) is formed of the princes of the royal family, the crown dignitaries, the archbishops, and the heads of certain old noble families, to which are added a Roman Catholic bishop and a Protestant clergyman nominated by the king, and an unlimited number of other members appointed by the crown. The Lower House, or Chamber of Representatives, consists of deputies of towns and universities and various religious corporations, chosen indirectly, the people returning "wahlmänner," or electors, who nominate the deputies. To be a deputy it is necessary to be over thirty years of age, and to be in possession of an assured income from funds, a trade, or profession; to be on the electoral lists it is required to be twenty-five years of age, and to be rated at a minimum of 20 mark, or £1 per annum. The representation of the country is calculated at the rate of one deputy to 7000 families, or about 85,000 souls of the whole population. A general election takes place every six years.

All new laws must receive the sanction of the senators and the deputies before they become binding; and the

general course of legislative proceeding bears some analogy to that of England.

On the consolidation of the German empire in 1871, Bavaria introduced the federal military organization of universal liability to service, but retained her own military laws, and, moreover, stipulated for the special distinction that the king should remain sole commander of his army during peace. On a peace footing the army consists of about 50,000 men, which can be raised to 150,000 in time of war.

The principal fortresses in Bavaria are Lindau, in the circle of the Rhine; Passau, on the Danube; Würzburg, with the citadel of Marienberg; and Ingolstadt, at the confluence of the Schutter and the Danube.

Two fine monuments, raised in honour of the German nation, grace the banks of the Danube in Bavaria. Six miles below Ratisbon, on a rock rising up boldly from the river, stands the Wallhalla, a splendid Doric temple erected by a king of Bavaria to receive the busts and statues of distinguished Germans, completed and inaugurated in 1842. On the Michaelsberg, a high rock at the junction of the Altmühl, which marks the eastern end of a grand gorge, the Temple of Liberation rises in majestic proportions, a memorial of the deliverance of Germany from a foreign yoke obtained by the battle of Leipzig. It was opened with great ceremony on the fiftieth anniversary of the conflict in 1863. The names of the different races who fought and conquered, with those of eighteen of the principal commanders, Austrians, Prussians, Bavarians, and others, are inscribed on tablets. Over the entrance are the words in bronzed zinc—"To the German Warriors of the War of Liberation. Ludwig I., King of Bavaria, 1863." The Michaelsberg rises to the height of 374 feet, and the temple ascends 204 feet above the summit.

History.—From the close of the eighth century, the kings of the Franks and Germans governed the country by their lieutenants, who were dukes or counts taken from various families. In 1070 it passed, by imperial grant, into the possession of the Guelphs; and in 1180, upon the expulsion of Henry the Lion, Duke of Bavaria and Saxony, it was transferred by the Emperor Frederic to Otto, count of Wittelsbach, a native prince, from whom the present king is descended. One of the most important acquisitions subsequently made was that of the earldom of the Rhenish Palatinate, with which the Emperor Frederic III. invested this family in 1216. Their dominions were afterwards divided between contending relatives at various times, until the dukedom of Bavaria was fully severed from the Upper and Rhenish Palatinates in 1329. Several other partitions ensued. The treaty of Westphalia not only recognized the title of the Bavarian princes to the Upper Palatinate, of which they had repossessed themselves in 1621, but confirmed them in the electoral dignity, to which they had been raised by the Emperor of Germany in 1623. Under the extinction of the direct Wittelsbach line in the person of Maximilian Joseph III. in 1777, the Elector Palatine Charles Theodore succeeded to the sovereignty. The first king of Bavaria was Maximilian Joseph, who assumed the royal dignity on the 1st of January, 1806, and was succeeded by his son Louis Charles Augustus I., 13th of October, 1825. Louis I. distinguished himself as a great patron of art. In an evil hour he fell under the influence of the notorious Lola Montes, and in March, 1848, his subjects rose in rebellion, seized the arsenal, and demanded reforms and the expulsion of the courtesan. Louis then abdicated, and was succeeded by his son, the late king, Maximilian Joseph II., who died at Munich, 10th March, 1864, and his eldest son ascended the throne under the title of Ludwig II. In the war between Prussia and Austria in 1866, Bavaria sided with the latter, and was occupied by the Prussian forces, who defeated the Bavarian troops in several severe engagements. On the termination

of the struggle Bavaria became the chief state of that South German Confederation which had been advocated by the Emperor Napoleon, and which he undoubtedly believed would assist him when he declared war against Prussia in 1870. In this, however, he was completely mistaken, for all the four states (Bavaria, Württemberg, Baden, and Darmstadt) threw in their lot with Prussia, and throughout the whole campaign no troops fought more often or more determinedly than the Bavarians. The suggestion that the King of Prussia should assume the title of emperor of Germany was from the first warmly advocated by Bavaria, which now forms part of the German empire.

BAXTER, RICHARD, an eminent Nonconformist divine, was born at Rowdon, in Shropshire, on the 12th of November, 1615. He was educated for the ministry, and studied under Mr. Richard Wickstead, chaplain to the council at Ludlow.

He was suddenly diverted from his pursuits by a proposition to try his fortune at court. The project seems not to have been unpalatable either to the future Puritan divine or to his father. Theology was thrown aside, and Baxter went to London with a special introduction to Sir Henry Herbert, master of the revels, as an aspirant to royal favour. His reception was courteous and even kind. For one month he mingled in the festivities of the palace—a period which was sufficient to convince him of the unsuitableness of such a mode of life to his tastes, his habits, and his conscience. He then returned home, and resumed his studies with a determination never to be again diverted from them. A protracted illness completed the preparation of his mind for the reception of those impressions of religious duty under which he acted throughout the remainder of his life.

When he was twenty-three years of age he was ordained by the Bishop of Worcester, and was appointed to the mastership of the free grammar-school at Dudley. At this time he entertained no scruples on the subject of conformity, having never examined with any nicety the grounds of subscription. At the end of nine months Baxter removed from Dudley to Bridgenorth, where he acted as assistant to the clergyman. He left this place after a residence of one year and nine months, on an invitation from a committee of the parishioners (1640) to become the officiating clergyman at the parish church in Kidderminster, the vicar having agreed, in order to settle disputes, to allow £60 per annum to a curate of their own choosing. Here his ministry was attended with much success, the ignorant and immoral inhabitants being awakened by his earnest preaching, and the morals of the town greatly improved.

During the civil wars of that period Baxter held a position by which he was connected with both the opposite parties in the state, and yet was the partisan of neither. His position at Kidderminster became an unsafe one, and he retired to Coventry, where he lived two years, preaching regularly to the Parliamentary garrison and to the inhabitants. He subsequently accepted a chaplaincy in the Parliamentary army. An illness compelled him to resign this duty, and we find him again at Kidderminster, exerting himself with renewed vigour to moderate conflicting opinions. The conduct of Cromwell at this crisis exceedingly perplexed that class of men of whom Baxter might be regarded as the type. For the sake of peace they yielded to an authority which they condemned as an usurpation; but nothing could purchase their approbation of the measures by which it had been attained and was supported. In matters of discipline and church government he occupied a middle ground between the Episcopalians and the Presbyterians. The views maintained by Baxter, blended as they were with the principles of monarchy, made them extremely popular towards the close of Cromwell's career.

It was expected that on the restoration of the king moderation would have prevailed in the councils of the nation,

and a conciliatory policy have been adopted with regard to religious opinions. Some indication of such a spirit appeared in the appointment of Presbyterian divines among the king's chaplains, and Baxter along with the rest. Among other measures a conference was appointed at the Savoy, consisting of a certain number of Episcopalian and Presbyterian divines, to devise a form of ecclesiastical government which might reconcile the differences and satisfy the scruples of the contending parties. Baxter himself drew up a reformed liturgy, which, with some alterations, he presented at this conference. The Presbyterians would have accepted Bishop Usher's scheme as a model, with any alterations which might be mutually agreed upon; but the bishops were secretly opposed to the arrangement. Oaths and subscriptions which had been suspended while there was any prospect of a union of parties were again called for. In accordance with this demand a law was passed in 1662, called the Act of Uniformity, so strict in its requisitions upon the debatable points of ceremonial worship that it had the effect of banishing at once 2000 divines from the pale of the English Church. Of this number was Baxter. Previous to the passing of this measure he had refused the bishopric of Hereford and other preferments offered him by Clarendon.

Finding his public duties at an end he retired, in July, 1663, to Acton, in Middlesex, where he employed most of his leisure in writing for the press. Some of his largest works were the fruits of this seclusion.

The indulgence granted in 1672 drew Baxter from his retirement at Tottenham, to which place he had removed. He settled again in London, and preached as a lecturer in different parts of the city, but more constantly at Finner's Hall and in Fetter Lane. But his public duties were frequently suspended by those rigorous enactments to which the Nonconformists were subjected during the last two reigns of the Stuarts.

It was his misfortune to be one of the unhappy victims of Jeffries. He was apprehended on a lord chief justice's warrant, on a charge of sedition and being hostile to episcopacy. The charge was founded on some passages in his "Paraphrase of the New Testament." On the trial Jeffries said upon the bench, "he was sorry that the Act of Indemnity disabled him from hanging him." His punishment was a fine of 500 marks, to lie in prison till it was paid, and to be bound to his good behaviour for seven years. For the non payment of this heavy penalty he was committed to the King's Bench Prison, where he lay until the 26th of November in the following year (1686), having been confined for nearly eighteen months. His pardon was obtained by the mediation of Lord Powis, and the fine was remitted. The solitude of his prison was cheered by the affectionate attentions of his wife. Baxter himself lived to see that favourable change in reference to religious toleration which commenced at the revolution of 1688. He died on the 8th of December, 1691.

The literary career of Baxter is not the least extraordinary part of his history. He published a body of practical and polemical divinity with a rapidity almost unequalled; the excellence of some of his practical writings secured them an unexampled popularity, and thus laid the foundation of a new theological system. The catalogue of his works contains nearly 168 distinct publications, of which four were folios and seventy-three quartos. Of these the most important are the "Methodus Theologiæ Christianæ" and "Catholic Theology," in which his peculiar doctrinal views are explained and defended, and the "Saints' Rest" and "Call to the Unconverted," works of a practical and devotional character. The two latter have been very popular, and have been translated into most of the languages of Europe. His life was written by Dr. E. Cadamy (1713) and by Orme (1830). A statue to him was erected at Kidderminster in 1875.

BAXTERIANS, a name which was applied to those who adopted the theological system of Richard Baxter, which may be described as a compromise between Calvinism and Arminianism. Its chief points are—1, that Christ atoned for all, but in an especial manner for the elect; 2, the rejection of the doctrine of reprobation; 3, that it is possible for a saint to fall away from saving grace. The Baxterians hardly ever attained the rank of a separate denomination, even when they were most numerous; and they are now completely scattered among different communions. Watts and Doddridge are amongst the most eminent divines who have embraced these opinions since the death of their author.

BAY (*bahia*, Portuguese, Spanish; *baia*, Italian; *baie*, French; *meerbusen*, German) is a portion of the sea of such a form that it is wider at the part nearest the open sea and narrower the further it advances into the mainland. Sometimes it is used where the term *gulf* would seem to be more appropriate. This latter term properly implies an arm of the sea which, without any or with only little diminution in breadth, enters very deeply into the mainland. Smaller portions of the sea of this description are called in Scotland *friths*, *friths*; in Norway, *fiords*; and in Iceland, *fiordurs*.

BAY, Sweet Bay, or Victor's Laurel (*Laurus nobilis*), is a native of the north of Africa and south of Europe and of Asia; at least it has been so long naturalized in these countries that it would be difficult to ascertain whence it was originally introduced. It was cultivated in England in 1561. The bay tree attains a height of 20 or 30 feet, and is grown in gardens, not only on account of its elegant appearance, but also for the aromatic fragrance of its leaves, which are evergreen and quite smooth. The fruit is endowed with aromatic properties as well as the leaves, whence both have been used in medicine as stimulants and carminatives, as well as a fatty oil expressed from the seed.

The leaves of *Laurus* have a single mid-rib. There are twelve stamens, with two-celled fertile anthers, and two glands, one on each side. The base of the calyx is persistent round the succulent fruit (*LAURACEÆ*). The Rose Bay of cottage gardens is *EUPHORIUM angustifolium*. Bayberry is another name for the CANDLEBERRY MYRTLE.

BAYA BIRD (*Ploceus baya*) is a species of WEAVER BIRD, its range extending throughout India into Assam, Burmah, and the Malayan peninsula. It is a small bird, less than 6 inches in length, of a brown colour above and yellowish-white beneath, with the crown of the head, the neck, and the breast bright yellow. It is chiefly remarkable on account of the curious pendulous nest it constructs. "It hangs," says Sir E. Tennent, "its pendulous dwelling from a projecting bough, twisting it with grass into a form somewhat resembling a bottle with a prolonged neck, the entrance being inverted so as to baffle the approaches of its enemies, the tree-snakes and other reptiles." The nest is suspended from the branches of fan-palms or date-trees, and sometimes from the babool (*Acacia Arabica*), whose formidable thorns suffice to keep all intruders at a distance. In Rangoon the thatch of a bungalow is frequently chosen for the suspension of the nests. The nest consists of two rooms, the outermost of which the male bird occupies, and in this layard always found two small masses of clay, attached one on each side of the perch occupied by the bird; the Cingalese asserted that these were for the reception of the fire-flies which they believe the male bird takes into his abode at the approach of night, and it has been suggested that these fire-flies dazzle the eyes of bats, which would prey upon the young birds. Some travellers discredit the story of the fire-flies altogether, and some have thought that the patches of mud serve to balance the nest and keep it steady in a gale of wind. The way in which these birds obtain the grass for their nests is thus described by Mr. Horne:—"The little bird alights at the edge of the high strong scent grass with its head down,

and bites through the edge to the exact thickness which it requires. It then goes higher up on the same blade of grass, and having considered the length needed, bites through it again. It then seizes it firmly at the first notch and flies away. Of course the strip of grass tears off and stops at the notch. It then flies away with the grass streaming behind it. As the edge of the grass is much serrated, the bird has to consider and pass it through the work the right way."

BAYADERES (from the Portuguese *baileadeira*, a dancing girl) is the European name for the trained dancing girls of India. These are divided into two great classes, each of which comprises many subdivisions. The first consists of the *Devadassi*, or servants of the gods, and they are devoted to the service of the temples. This class is divided into two distinct grades, the first consisting of girls recruited from the influential Vaisya caste, and the second from that of the Sudras. The girls of the first class dwell within the inclosure of the temple, and are not allowed to leave it without the permission of the chief priest. Their duties are to prepare the garlands of flowers used to adorn the images of the gods, to dance before them, to sing their praises, and to take part in the solemn processions held in their honour. They are not permitted to marry, but are allowed to receive the attentions of a lover of high caste, their sons being trained as musicians and their daughters brought up in their own profession. The duties of the second class are very similar, but its members do not live within the temple, and only take turns in its service, except in the public processions, when all must appear. They are also permitted to give their performances for hire, and are employed by wealthy Hindus at marriages, festivals, &c. The second great class of the dancing girls consists of the *Nautchis*, who are not attached to any temple, but who travel about the country performing in the public houses, at private feasts, and in association with wandering musicians. Some of these form little independent companies, the members of which share the profits gained by the performances. Others are under the direction of a leader who receives all that is earned, and pays the rest a small sum for food and clothing, while he

bought or stolen while very young by old dancing women. The dance of the nautch girls consists of a species of pantomime, the subject of which is explained by the singing. It is in some cases highly indecent, but the majority of the performances are not of this character. The songs, however, usually express in very warm language the sentiments of amorous passion as addressed by the female to her lover. There are similar dancing girls employed in Egypt.

BAYARD, PIERRE DU TERRAIL, *Seigneur de Bayard*, known by the honourable appellation of "the Good Knight, without fear and without reproach" (*le Bon Chevalier, sans peur et sans reproche*), was born in the year 1475 at the Châteaun de Bayard in Dauphiné. Almost all his immediate ancestors died on the field of battle. His great-great-grandfather fell at Poitiers, his great-grandfather at Agincourt, his grandfather at Montheré, and his father also received many wounds in the wars of Louis XI. He was placed when thirteen years old in the household of the Duke of Savoy as page, in which capacity he continued for five years. In the latter end of the year 1494 Bayard accompanied Charles VIII. in his expedition against Naples, and greatly distinguished himself at the battle of Fornovo, fought on the 6th of July in the next year. He served also in the Italian wars of Louis XII., which began in 1499, and successively against Spain, Genoa, and the pope (Julius II., he who began St. Peter's). He was also present at the famous "Battle of the Spurs," fought against our Henry VIII., at Guinegate, near Terouenne, in Picardy, on the 16th of August, 1513, in which he greatly distinguished himself, but was taken prisoner. Henry gave him up without ransom.

Bayard attended Francis I. in the war undertaken to recover Milan and the other Italian conquests of his predecessor. In the bloody battle of Marignano (13th September, 1515), which lasted two days, Bayard displayed his usual romantic daring and prowess. When the battle was won, Francis, who had fought by his side, and who had witnessed his extraordinary valour, begged and received the honour of knighthood at his hands upon the field. Seven years later he performed the greatest military achievement of his life in the defence of Mézières against Charles V. Though he had only 1000 men under his command, and was assailed by an army of 35,000, he successfully resisted all assaults, and saved France from imminent ruin.

In 1524 Bayard had a command in the force which Francis I. sent to Italy under Bonnivet to act against the army of the Emperor Charles V., directed by the celebrated Constable de Bourbon. Bonnivet was compelled to abandon his intrenchments at Biagrasso, and move nearer to the Alps. He was pursued by the imperial forces, who attacked his rear with great fury just as he had reached the banks of the Sesia. Bonnivet, while displaying much valour in rallying his troops, was wounded in the arm by a ball. He sent to Bayard immediately, telling him that the fate of the army was in his hands. Bayard put himself at the head of the men-at-arms, and kept the main body of the enemy occupied long enough to enable the rest of the French forces to make good their retreat. While thus engaged he received a mortal wound from a ball, and fell from his horse (30th April, 1524). He ordered himself to be placed with his back against a tree and his face to the enemy. In this situation he was found by Bourbon, who expressed his regret at seeing him in this condition. "Pity me not," said the dying man; "I die as a man of honour ought, in the discharge of my duty; they, indeed, are objects of pity who fight against their king, their country, and their oath." His body was restored to France by the admiring enemy, and was interred at Grenoble. It must not be thought that Bayard was a mere fighter. He excelled in every other knightly virtue as well as courage; justice, generosity, and loyalty found in him their chief example. See "Histoire du Gentil Seigneur de Bayard" &c. par Loyal Servet. Édition rapprochée du Français moderne par Lorédan Luchey (Paris, 1882). An English translation was published in London in 1883.

BAYAZID'. See BAJAZIT.

BAYAZID', a town in Armenia, situated at the base of Mount Ararat, in 39° 21' N. lat., 41° 20' E. lon., 50 miles S.S.W. of Erivan, and about 180 miles E. of Erzerum. In 1830 it had a population of 15,000 inhabitants, but has now only about 5000. In addition to its two churches and three mosques it possesses a monastery, called Kara Killeesee, renowned for its beauty and antiquity. There is also a citadel and an arsenal. Standing, as Bayazid does, on the highroad between Armenia and Azerbaijan, it has always been a place of importance—an importance, indeed, fatal to it, for its decrease of population is chiefly owing to its misfortunes in being the scene of conflict in the several wars between Russia and Turkey. In 1829 the Russians took it, and again in 1854, when, after a battle fought before its walls, they destroyed the fortifications and left. In May, 1877, the Turkish commander evacuated the town on the approach of the Russians, the place not being considered an eligible one for defence. In June the Turks returned and laid siege to the town, and the water supply of the Russian garrison having been cut off, a capitulation was agreed to. While the Russians, however, were marching out, a large force of Kurds fell on the defenceless men and commenced a wild massacre. Little effort was made to stay the slaughter, and 236 men were thus killed. The remainder of the Russians took refuge in the citadel, where, refusing any further suggestion of surrender, they continued to hold out for twenty-three days. On the 10th

July General Tergukassoff raised the siege, and relieved his beleaguered comrades.

BAYEUX, an episcopal town in the French department of Calvados, stands on the little river Aure, about 6 miles from its mouth, 155 miles W. of Paris, and 17 W.N.W. of Caen. It had a population of 9000 in 1882. The town is old, and many of the houses are built of wood and plaster. The large cathedral is said to be the oldest place of Christian worship in Normandy; some portions of the structure date from the eleventh century, when the Conqueror's brother Odo held the see of Bayeux. It is built in the form of a cross and in the Gothic style. The west front is surmounted by two lofty towers of unequal height crowned with pyramidal spires; the higher of the two has an elevation of 246 feet. Above the choir springs an octagonal bell-tower, which terminates in a pyramidal lantern, and this is supported by eight elegant columns; the entire height of this tower is 240 feet. There are altogether nearly 3000 capitals in the cathedral, all sculptured differently. The other noteworthy churches are those of St. Euphère, which is situated outside the town, and St. Patrice. Before the French Revolution there were seventeen churches in the town and its environs; there are now four. The town-house, in which the famous tapestry of Queen Matilda was formerly kept, is the only other remarkable building. Bayeux is famous for its lace, and its porcelain maintains a very high repute. Muslins, serges, calicoes, table-linen, cotton yarn, leather, and hats are also manufactured. The celebrated **BAYEUX TAPESTRY** is now kept in a room of the public library. The town is situated in a very fertile plain, rich in pasture; hence there is a good trade in agricultural produce, but particularly in butter, fat cattle, pigs, poultry, &c. Five large fairs are held annually; one of which, on the 1st and 2nd of November, is a great horse fair. Bayeux has a college, tribunals of first instance and of commerce, an ecclesiastical seminary, and a public library. It is the chief town of the *arrondissement* of Bayeux.

BAYEUX TAPESTRY, a web or roll of linen cloth or canvas, preserved in the library at Bayeux, in Normandy, upon which a continuous representation of the events connected with the invasion and conquest of England by the Normans is worked in coloured woollen thread, after the manner of a sampler. The stitches consist of lines of coloured worsted laid side by side, and bound down at frequent intervals by five cross stitches. The parts intended for flesh are left untouched, and show the brown-holland tint which the linen ground has assumed by age. It was originally all in one piece, 20 inches wide and 227 feet long, divided into seventy-two compartments, each of which bears an explanatory Latin inscription: it is now for convenience of exhibition cut into eight pieces, stretched in a long glass case. It contains more than 760 figures of beasts and birds, 623 of men, forty-nine of trees, thirty-seven of buildings, and forty-one of ships. This singular monument was, by order of Bonaparte, removed to Paris in 1803, but was at length returned to Bayeux, to which place Mr. Charles A. Stothard was sent in 1816 by the English Society of Antiquaries for the purpose of making an accurate copy of it, which they subsequently engraved and published in the sixth volume of the "*Vetusta Monumenta*."

M. Lancelot, a member of the French Academy of Inscriptions, first discovered a portion of the tapestry in 1724, copied in a collection of Foucault, "*intendant*" of Normandy, not long before. Father Montfaucon, a Benedictine, connected this drawing, the original of which had been sought in vain by Lancelot, with a band of tapestry used to decorate the nave of Bayeux Cathedral on certain grand occasions; and described the whole in 1730. It is from this author that we receive the tradition common at Bayeux in his time, that Queen Matilda was the author of the tapestry. The end was ragged and unfinished in his

time, as it is now, and the cloth, which was rolled on a kind of winch, bore the appearance of having been much longer. There is no doubt that, if it ever were finished, it went to the coronation of the duke as king of England. It was called by the priests in Montfaucon's time, "*La toilette du Duc Guillaume*," *toilette* meaning a drapery of the church-nave. Since this time the contest as to its authenticity, its date, its authorship has been practically incessant; but the best authorities now agree in considering it a contemporary work. In fact, as an authority the Bayeux tapestry grows in importance year by year, as its study reveals its priceless value. The historian E. A. Freeman, whose "*Norman Conquest*" is one of those exhaustive works which cover the entire ground of a period, and almost leave no more to be said, writes thus of the tapestry ("*Old English History*"), comparing its account of the Conquest with those of William of Poitiers and of Guy of Amiens:---

"The third account, and I am inclined to say the best of all the three, was not written with a pen, but was wrought in stitch-work. This is the famous Tapestry of Bayeux, where the whole story, from Harold's setting out to go to Normandy till the end of the battle, is worked in pictures with Latin legends over each scene. There is no doubt it was wrought very soon after the battle; but there is no reason at all to think, as many people have thought, that it was wrought by William's queen, Matilda. It is plain that it was wrought by order of Bishop Odo" (the Conqueror's brother) "and was given by him to his cathedral church of Bayeux, where it used to be kept, though it is now in the library there. That it was made for Odo and for Bayeux is plain, because several people are made very prominent in it whom we hear nothing of anywhere else, but whom we know from Domesday Book to have been followers of Odo's, and who were therefore no doubt well known at Bayeux. This tapestry gives the best and fairest account of all the Norman authorities."

The tapestry has the further and quite inestimable advantage of showing the costume and armour, the manners and customs of the period in a most striking way.

The scenes of the tapestry are divided in the clearest manner by trees or by buildings. Mr. Bruce says wittily, "The trees are of a species which does not flourish in our modern woods, but which, nevertheless, grows very abundantly in the MSS. of the tenth and eleventh centuries" ("*Bayeux Tapestry*," 1856). Our Plates give four of the most impressive of these scenes, in the relative order in which they occur in the tapestry. Along all the tapestry runs a border, both above and below, full of quaint devices—now of grotesque birds and beasts, now of fables (the "lion and the mouse," the "fox and the crane," &c.), and now of subjects akin to the pictures above, as the ships which border the shipbuilding scenes, and the heaps of dead and dying insulted by the herd of camp followers, who strip the armour from the bodies—which extends the vigorous scenes of the great battle to the whole width of the canvas.

This "history wrought in stitch-work" begins with our first illustration, **EDWARD REX**; showing the Confessor seated on his throne instructing Harold and another as to some state affair. The French commentators naturally say that it is the commission to Harold as chief subject of England, to journey to Duke William's court of Normandy, and announce to him his recommendation as successor by Edward, subject, of course, to the choice of the witan of England. Then we trace Harold's course to Bosham (near Chichester) in Sussex, at that time a seaport, and one of the Godwin estates; his prayers in the chapel there; his embarkation after a final feast with his shoreward friends (Harold, like all his friends, divests himself of his lower garments to wade to the ship); his shipwreck on the coast of Flanders; his seizure by Count Guy. This episode is told differently by the other histories; but the version of the tapestry is preferred by Mr. Freeman

who points out that whatever the motive of Harold's voyage, if he were shipwrecked on a strange coast, the prince of that land would hold him to ransom by the custom of the time just as if he had been taken in fight. Successive scenes show us discussions as to ransom with the rapacious Guy; arrival of messengers to Guy from Duke William, his sovereign, who demands his prisoner. Harold has probably found means of letting the duke know his position. Eventually we find Guy himself conducting Harold to Duke William, who receives him splendidly. Together they undertake a campaign against Conan, count of the Bretons, in which we see Harold distinguishing himself in many ways. In one scene he is lifting up unaided two Normans who are being swept away by the river Coesnon. Eventually Conan gives up the keys of Dinan, his last stronghold, holding them out on a lance to a knight of the Conqueror (probably Harold himself). This campaign is described in none of the chroniclers, but is recorded in the tapestry alone, and many scenes are devoted to it. Then we find Harold receiving armour at William's hands, in recompense for his conduct of the expedition—a fact which almost made him William's man; but according to the tapestry, which the great authority already cited specially approves on this point, William made this still clearer, since we find a scene (the second of our illustrations) showing Harold at Bayeux (Bagie) swearing an oath of fealty to the duke. Then he returns to England, and the representation of the obsequies of the Confessor follows at once; Harold is then chosen by the people (a vigorous scene), and crowned by Archbishop Stigand, the latter being the subject of our third illustration. A miraculous star or comet (which our modern astronomers find to be Halley's comet in one of its earlier appearances) flames in the sky, to the alarm of the people; and messengers arrive announcing the invasion of the King of Norway. Harold's triumph at Stamford is left untold, and the scene now changes to Normandy, where some spirited scenes of shipbuilding show the vigorous action of Duke William. This portion culminates in one of the principal divisions of the whole tapestry, the crossing of the Channel, the duke's ship carrying a consecrated banner with a cross sent him by the pope. Scenes of feasting follow, the materials got by plunder, very frankly avowed in the tapestry, the guests as elsewhere tearing their fish or meat to pieces with their hands, occasionally helped by a knife, forks being unknown for centuries later. Next we witness the assault and burning of Hastings; whence we see the soldiers leaving for the battle of Hastings, or rather of Senlac, whither the victorious Harold has arrived from the north. The different episodes of that well-known fight are vigorously portrayed. Odo, bishop though he be, rallies the fugitives; William throws up his vizor at the cry of his death raised by his routed soldiers; a fresh attack is made, and finally *HIC HAROLD REX INTERFECTUS EST*—"Here Harold the king is slain" by an arrow shot high, and falling through the eye-hole of his helmet to pierce his brain. After this the unfinished fragment remaining begins to show the utter rout and slaughter of the English. The king's death forms the fourth illustration of our Plate: the artist of the tapestry shows in immediate succession the king fighting by the side of the Great Dragon, the standard of Wessex, then the king drawing the fatal arrow from his eye as he falls.

Besides Stothard's work, noticed above, there is a fine reduced coloured fac simile of the tapestry by MM. Jubinal and Sansonetti (Paris, 1838), with French text; the "Bayeux Tapestry" of M. Bruce already spoken of, with a small coloured fac simile, much inferior to the excellent text (London, 1856); and two photographic representations—one by Fowke, published by the Arundel Society (London, 1875); and one by Comte, with French text (Paris, 1881).

BAYLE, PIERRE, an eminent critic and controver-

sial writer, was born at Carlat, 18th November, 1647, in the Comté de Foix, in France. His education was commenced under the care of his father, the Protestant minister of Carlat, continued at the Protestant university of Puy Laurens, where he studied from February, 1666, to February, 1669, and concluded at the Catholic university of Toulouse. He had not been there more than a month when he made public profession of the Roman Catholic religion. It would seem that his creed was lightly taken up, for, during his short residence at Toulouse, he was reconverted to Protestantism by the conversation of his Protestant connections. Perhaps this facility of belief in early life may have had some effect in producing the scepticism of his later years.

In August, 1670, he made a secret abjuration of Catholicism, and immediately went to Geneva, where he lived four years, supporting himself by private tuition. In 1675 he was elected to the chair of philosophy in the Protestant university of Sedan, which he filled during five years; but in 1691 the university was arbitrarily suppressed by a decree of Louis XIV. Thus deprived of employment in France, Bayle accepted the appointment of professor of history and philosophy at Rotterdam, 1681.

In 1682 he published his "Letter on Comets," directed against a superstitious panic which had been excited by the appearance of a comet in 1680; and the same year his famous critique of Maimbourg's libellous "Histoire du Calvinisme." The French government ordered it to be burned, which had the usual effect of causing it to be generally read.

In 1684 Bayle commenced his *Nouvelles de la République de Lettres*, a literary journal, which he continued till 1687, when he gave it up through illness. Another work of Bayle's, entitled "Commentaire Philosophique sur ces Paroles de l'Evangile; *Contrains les d'entrer*," called forth by the persecution then raging in France, and earnestly advocating toleration, caused him to be accused of enmity to the Protestant cause. In 1693 he was deprived of his chair and its emoluments, and refused even a license to teach in private. He now turned his attention to the composition of his great work, the "Dictionnaire Historique et Critique." This curious book is still interesting, full of unusual points of criticism, and evincing a most extraordinary range of research. Foot notes and digressions abound. The first volume appeared in 1695. It obtained great popularity, so that a second edition was soon called for; but its freedom in philosophical and religious matters gave great offence to the religious, and incurred a public censure from the consistory of Rotterdam. After the publication of his dictionary, Bayle continued writing to the end of his life. Controversy seems to have been his pleasure; and it is probable that the attacks made on his works made no impression on his tranquillity. He died at Rotterdam, 28th December, 1706, in the sixtieth year of his age.

The later folio editions of Bayle's Dictionary are comprised in four volumes. Bayle's miscellaneous works fill four volumes also. There is a good contemporary life of Bayle by Des Maiseaux (Amsterdam, 1712).

BAYLEN or **BAILÉN**, the Roman *Betula*, a town of Andalusia, in the province of Jaen, 24 miles from the city of that name, and 56 miles north of Granada. The soil in the neighbourhood is very fertile, and produces corn, fruit, oil, and wine, the two last in abundance. The town contains one parish church, an ancient castle, a palace belonging to the Count of Baylen, and an hospital. The inhabitants, who amount to 8000, are employed in agriculture, the manufacturing of glass, bricks, and common cloth. Here General Dumout, with 18,000 French troops, surrendered to the Spanish in July, 1808, after a bloody contest of several days' duration. This was the sole victory of the Spaniards in the Peninsular War, and the first great blow to the French arms. The prisoners were sent to the hulks at Cadiz, although before their surrender they had been

promised permission to return to France. It is believed that it was near Baylen that Scipio gained great victories over Hasdrubal in 209 B.C., and over Mago and Masinissa 206 B.C. (Polyb. x. 38, xi. 20; Livy, xxvii. 18-20, xxviii. 13).

BAYONET. See ARMS.

BAYONNE, a fortified town of France on the Spanish frontier, in the department of Basses Pyrénées, 487 miles S.W. of Paris, 65 W. of Pau. It had 28,000 inhabitants in 1882. It is favourably situated for trade, being at the junction of two navigable tide rivers, the Adour and the Nive, which united fall into the Bay of Biscay 2 or 3 miles below the town. By these rivers Bayonne is divided into three parts. That part situated on the left bank of the Nive is called Grand Bayonne, that between the two rivers Petit Bayonne, and that on the right bank of the Adour St. Esprit. The latter was once in the department of Landes. Of its 7000 inhabitants more than 2000 are Jews—the descendants of those expelled at different times from Spain. The harbour is safe and well sheltered.

Bayonne is a fortress of the first class. Each part of it is defended by ramparts flanked by bastions and surrounded by wide and deep ditches, which can be flooded at pleasure. Grand Bayonne has a castle flanked by four round towers, called the Old Castle; Petit Bayonne has the new castle, flanked by four bastions; and adjoining the suburb St. Esprit is a citadel, which is one of the finest works of Vauban, and which commands at once the two rivers, the city, and the approaches to it by land and sea. Bayonne possesses one of the finest arsenals in France, and has a military hospital capable of accommodating 2000 patients.

The town is handsome. The houses are well built of stone, the streets are wide, and the squares adorned with good buildings. The different parts of the town are united by bridges. The numerous vessels, large and small, by which the rivers are covered, give animation to the scene. Of the public buildings the Cathedral of Notre Dame and the Mint may be mentioned. The town has a tribunal of first instance, a tribunal and chamber of commerce, a school of navigation, and a theatre. The environs are remarkably beautiful, having woods, hills, rivers, meadows, and cultivated fields stretching along the foot of the lofty Pyrenees. There is a fine promenade, called Allée des Marins, which is lined with trees, and extends about a mile in length along the left bank of the Adour.

Bayonne has extensive rope-walks, glass bottle factories, sugar refineries, and shipbuilding yards. It is famous for its hauns, liqueur-brandies, and chocolate. The trade is very considerable. The exports consist of broadcloth, linen, silks, and other manufactured articles, wine, brandy, timber, planks, pitch and tar, drugs, &c. The imports are chiefly Spanish wool, saffron, liquorice, bullion, &c. The coasting trade employs the greater part of the vessels which enter or leave the port of Bayonne. Bayonne is the seat of a bishop. It was here that Charles IV. resigned to Napoleon in 1808 the crown of Spain.

Bayonne was the *Lapurdum* of the Romans, and was fortified and a place of trade as early as the third century. The present town was founded in the eleventh century and ultimately came into the possession of the English, by whom it was held until 1151, being the last place they retained in France except Calais. Bayonne has often been besieged, but has never been taken. It was invested by the English in 1811, but the siege was abandoned in consequence of Napoleon's abdication. The construction of a bridge of boats over the Adour below the town, and the passage of the allies across it, displayed the genius of Wellington to its fullest extent; and is styled by Napier, in his "History of the Peninsular War," as "a stupendous undertaking which will always rank among the prodigies of war." The word bayonet is derived from the weapon having been invented in this town.

BAY-SALT, a coarse impure variety of salt, largely

obtained from *salterns* or *salt-marshes*, which exist on some parts of the English coast, but more especially along the coasts of France, Portugal, and Spain. The *salterns* are large shallow ponds, generally rectangular in shape, ranged along the shore, a few feet below the sea level. The sea water is run into a large saltern, and when the sand and suspended matter has settled is drawn off into somewhat smaller and shallower salterns, where the water is evaporated by the heat of the sun and by the action of the wind. After a time crystals of salt begin to form and sink to the bottom. They are then raked up on to the sides of the saltern, allowed to drain, and packed for removal.

BAZA (the Roman *Bast*), a city of Granada in Spain, about 50 miles N.N.E. of Granada. It is the seat of a bishop, has a cathedral, an ecclesiastical seminary, and an hospital. The city stands in a rich agricultural district, and is famous for its red wine. It has also a trade in hemp. Under the Moors it had a population of 50,000. It was taken from them by Isabella in 1489, after a seven months' siege. There are still many remains of Moorish architecture in the town. In the environs Marshal Soult defeated a large Spanish army in 1810. The population numbers about 8000; and Ford, in his "Handbook of Spain," says the women of Baza are amongst the prettiest in the country.

BAZAAR. The word *bazaar* is Persian, and its primary meaning is "a market." In Turkey, Egypt, Persia, and India this term distinguishes those parts of towns which are exclusively appropriated to trade. In this exclusive appropriation they resemble our markets, but in other respects approximate more nearly to our retail shops.

The regular bazaars consist of a connected series of streets and lanes, and when of a superior description they are vaulted with high brick roofs. The domes or cupolas which surmount the vaulting admit of a subdued daylight. In the best specimens of the vaulted bazaars the passages are lined on each side with a uniform series of shops, the floor of which is a platform raised from 2 to 3 feet above the level of the ground, and faced with brick. As the vault springs from the front of the line of shops they seem like a series of recesses, and the partition walls between them appear like piers supporting the arch. These recesses are entirely open in front, in all their height and breadth; they are scarcely more than very small closets, seldom exceeding 6 feet in breadth, rarely so deep as wide, but generally from 8 to 10 feet in height, and occasionally more. But in the more respectable parts of large bazaars there is generally a little door in the back wall which conducts to another small and dark closet, which serves the purpose of a store-room. The front cell is the shop, on the floor of which the master sits with his goods all around him—the articles most in demand being placed so within his reach that he has seldom occasion to rise, which, if he is a Turk, he rarely does without manifest reluctance.

Business commences and terminates with daylight in Oriental bazaars. No trade or handicraft employment is in general carried on in the East by candle-light. None of the shopkeepers or artisans reside in the bazaars. When it gets dark every one shuts up his shop and goes home. The fastenings of the shops are very slight; but the bazaars are in general well watched, and frequently secured with strong gates.

The peculiar principle of the Oriental bazaars is that all the shops of a city are there collected; and that in this collected form the different trades and occupations are severally associated in different parts of the bazaar, instead of being indiscriminately mingled as in our streets. The principle of association for facility of reference is the true principle of a bazaar.

The various characteristic displays of Oriental manners which the bazaars furnish, the nature of the goods exposed for sale and the splendid appearance they sometimes make,

the manner in which the artisans conduct their various labours, the variety of costumes which meet the eye, and the Babel-like confusion of tongues, form a scene of unequalled singularity and interest.

In England the use of the word is chiefly confined to places opened for the sale of fancy and other articles for charitable purposes.

BAZAS, a town of France in the department of Gironde, and capital of an arrondissement of the same name. It dates from the Roman period, and is mentioned by Ptolemy as an important place under the name of *Cossio*, the capital of the *Vasates*. It possesses a tribunal of the first instance, and has 5000 inhabitants. It is picturesquely seated on an eminence, at the foot of which flows the Benve. It is ill built, but has agreeable walks formed upon the walls, the remains of its ancient fortifications. In a handsome square surrounded by an arcade stands the church (once a cathedral), a Gothic building of the thirteenth or fourteenth century; though not large, it is well proportioned, and has been classed among the "historical monuments" of the country. It is remarkable for the number of its pillars, and is rich in sculpture. The inhabitants manufacture druggets and hats. They deal in corn, cattle, wood for fuel, and timber for building. Bazas stands on the high-road from Bayonne to Bordeaux, about 33 miles S.S.E. from the latter, to which there is also a railway.

BAZEILLES, a village of France, in the department of Ardennes, being a suburb of Sedan. During the battle of Sedan, between the French and Germans, on 1st September, 1870, Bazeilles was stormed by the Bavarians, and burned, it was said, because the inhabitants fired on the ambulances. Of the 2000 inhabitants it was asserted at first that scarcely fifty remained alive, and these indignantly denied any provocation having been given. The place had been previously twice bombarded and stormed by the maddened combatants. Much controversy arose on the subject, and General Von der Tann proved that the number of deaths had been grossly exaggerated, and that there had been much provocation. The place has since been restored and a war memorial erected.

BAZTAN or **BASTAN**, a valley in the Pyrenees, to the north of Pamploña, Spain. Several mountain streams form a river in the valley, which is called Baztan-zubi. The valley has about 8000 inhabitants, and produces Indian corn, wheat, pulse, and flax. The meadows and forests are held in common. Every man is bound by law to plant a certain number of trees every year. Baztan is ad by particular fu pr ile which similar to those of the Basque Provinces. The inhabitants speak the Basque language. The capital, Elizondo, is situated on the Baztan-zubi.

BDELLIUM is gum-resin, brought from India and Africa. Indian bdellium is obtained from *Balsamodendron agallocha* and *Balsamodendron Mukul*. The source of African bdellium is *Balsamodendron africanum*. The bdellium of the ancients is said by Pliny (book xii. c. 9) to have been brought from Bactria and other parts of Asia. This substance occurs in masses sometimes as large as a walnut, in oblong or angular pieces of a yellow, red, or brownish colour. The clearest pieces are transparent, the odour is weak and peculiar, the taste bitter, balsamic, and resembling myrrh or Venice turpentine. Like myrrh in appearance, it also resembles it in its effects upon the human system, and is often fraudulently substituted for it; it is, however, weaker, while it is more disagreeable and acrid. It is now disused in Britain, but is found intermixed with gum-arabic. It is still in use in Indian pharmacy, and is also burned as incense in the temples. Another of the "spurious gums" imported with myrrh is *opaque bdellium*, which is produced by *Balsamodendron Pley-fairii*. It has only a faint odour.

The bdellium mentioned in the second chapter of Genesis

is most likely a pearl, and has no reference to the substances above mentioned. See *BALSAMODENDRON*.

BEACHES, RAISED, a term used in geology to characterize those flat terraces which have been formed along the sea-shore, but have been raised above the sea-level. While some raised beaches contain only species now living in the adjoining sea, others include one or more extinct species, and thus conduct by insensible gradations from the almost modern shell-beds of the raised shores of the Forth and the Clyde and the variously elevated shell accumulations of Uddewalla and other points of Sweden, to the still richer and more ancient deposits of Sicily. Nearly all the British, Irish, and European shores furnish examples in abundance, as the shores of the Forth and Clyde, the coasts of Yorkshire and Lancashire, the coasts of Cornwall and Devon, of Wexford, Normandy, Sweden, and the Mediterranean. Darwin, in his "Geological Observations," shows that the west coast of South America abounds with these raised beaches. They increase in height above the sea-level towards the south. On the Bolivian frontier they are 70 or 80 feet above sea level, whereas near Valparaiso a raised beach occurs at the height of 1300 feet.

BEACHY HEAD, a promontory in Sussex, about 2 miles from Eastbourne. It is about 550 feet high, and is surmounted by a lighthouse which is visible at a distance of 22 miles. The walk to the Head is a very favourite one for visitors to Eastbourne, and the name is believed to be a corruption of the French *beau chef*; "beautiful headland." The French defeated the English and Dutch fleet off Beachy Head in 1690.

BEA'CON, a sign ordinarily raised upon some foreland or high ground as a sea-mark. It is also the term used for the fire-signal which was formerly set up to alarm the country upon the approach of a foreign enemy. The word is derived from the Anglo-Saxon *beacen* or *been*, a sign or signal, whence also *beck*, *beckon*.

Fires by night, as signals to convey the notice of danger to distant places with the greatest expedition, have been used in many countries and in all ages.

Lord Coke, in his "Fourth Institute," chap. xxv., speaking of our own beacons, says, "Before the reign of Edward III. they were but stacks of wood set up on high places, which were fired when the coming of enemies was desired; but in his reign pitch-boxes, as now they be, were, instead of those stacks, set up; and this properly is a beacon." These beacons had watches regularly kept at them, and horsemen, called hobbelaers, were stationed by most of them to give notice in daytime of an enemy's approach, when the fire would not be seen. (Camden, "Britannia," 1789.)

The power of erecting beacons as sea-marks was originally in the king, and was usually delegated to the lord high admiral. In the eighth year of Elizabeth an Act passed (c. 13), by which the corporation of the Trinity House of Deptford Strond were empowered to erect beacons and sea-marks on the shores, forelands, &c., of the country, and to continue and renew the same at the cost of the corporation.

Professor Ward, in his "Observations on the Antiquity and Use of Beacons in England" ("Archæologia," vol. i. p. 4), says the money due or payable for the maintenance of beacons was called *beconagium*, and was levied by the sheriff of the county upon each hundred.

An iron beacon or fire pot may still be seen standing upon the tower of Hadley Church, in Middlesex; and remains of many beacon-hills, nearly all retaining the name, occur in various parts of England.

BEACON, in navigation. See *BE'CON*.

BEA'CONSFIELD, a market-town in Buckinghamshire, is situated on high ground on which beacon fires were formerly lighted, 24 miles W. by N. from London by the road from London to Oxford, and 30½ by the Great Western Railway, being 2 miles from the Woburn Green

station on that line. The parish church is built with flints and square stones, and most of the houses are constructed of a mixture of flint and brick. The town consists of four streets, arranged in the form of a cross. The population in 1881 was 1635. In the church are deposited the remains of Burke (who declined the offer of a peerage, with the title of Lord Beaconsfield), and in the churchyard is a monument to the poet Waller, who owned the manor. The title of Viscountess Beaconsfield was conferred on Mrs. Disraeli during the time of her husband's first premiership in 1868. The Viscountess died in 1872, but the title was revived in 1876, when Mr. Disraeli himself was raised to the peerage as the Earl of Beaconsfield.

BEACONSFIELD, EARL OF. BENJAMIN DISRAELI, one of the most brilliant English statesmen of the nineteenth century, who, after a long and arduous political career, was raised to the peerage as Earl of Beaconsfield, was born 24th December, 1804. As is well known, from the publicity he gave to the fact and from the pride he took in his descent, he was sprung from Jewish parents, his father being Isaac Disraeli, or d'Israeli as he spelt his name, well known in literature as the author of "Curiosities of Literature" and other works which enjoyed a considerable reputation in their day. After a brief apprenticeship in a solicitor's office, young Disraeli abandoned his articles and quitted the law for the calling for which he felt himself more especially suited. His first appearance as a man of letters was a decided success. "Vivian Grey," his first novel, was published in 1826, and its humorous gallery of portraits of famous contemporaries, sketched with all the epigram of Parisian wit, its daring individuality, its thinly-veiled details of a scandal-loving age made it the rage of several seasons, and it is still read with pleasure. The popularity of the book naturally led its author to other literary enterprises, and "The Voyage of Captain Popanilla," a satire on society and politics, in imitation of Swift; "The Young Duke;" "Alroy," a tale of the twelfth century; and "Contarini Fleming," a physiological romance, purporting to be a study of the development and formation of the poetic character, appeared in rapid succession. Owing to the excitement attendant upon the question of reform, Benjamin Disraeli now turned his mind to politics, and keenly desired to take his seat in the House of Commons. His first efforts to win the votes of a constituency failed. He stood for High Wycombe, a borough in his favourite county of Bucks, twice in the year 1832, and each time found his name at the bottom of the poll. Two years afterwards, for the third time, he courted political fortune at High Wycombe, but with no better success. It was on this occasion that Disraeli accused Daniel O'Connell of having been false to the principles he had so ostentatiously advocated, an accusation which the latter met by asserting that Disraeli was a "miscreant," and a descendant of "the impenitent thief who died upon the cross." Deserting High Wycombe, Disraeli now offered himself to the electors at Taunton, but for the fourth time was rejected by a constituency. His perseverance was, however, at last to be rewarded. The country was wearied with the indolence and indifference of the Melbourne government, and on Disraeli contesting Maidstone in the year 1837 in the Tory interest, he was returned to Parliament as the colleague of Mr. Wyndham Lewis, whose widow he afterwards married. During the first years that he sat in the House of Commons there is little of importance to record. His first speech, like the first speech of Sir Robert Walpole, of Canning, Grattan, Sheridan, and Erskine, was a failure; he spoke afterwards less pretentiously, and gradually gained the ear of the house, and began to be looked upon as a rising politician. He quitted Maidstone for Shrewsbury; he was the moving spirit of the "Young England" school; he wrote "Coningsby," one of the best political novels in the language, and

other works of fiction of lesser merit; but it was not until Sir Robert Peel acceded to power and deserted the cause of protection that Benjamin Disraeli, at one bound, proved the eloquence within him, and showed that he was as much a master of strategy as he was of invective. In the debates of 1845-46 upon the corn laws it was Disraeli, and none other, who was the mouthpiece of the dissatisfied section of the Tory party. Never in the whole annals of parliamentary history was change of opinion more bitterly and more fiercely criticised than the conversion of Sir Robert Peel from the principles of protection to those of free trade. It was Mr. Disraeli's opportunity, and he availed himself to the full of all the advantages the situation offered. A large section of the Tory party considered themselves betrayed by the leader they had trusted, and they were burning to express their indignation at such conduct, and at the same time to exhibit their opposition to a measure which they deemed would usher in the ruin of the agricultural interest. And now Mr. Disraeli stepped in. All the wealth of his eloquence, all his wit, his political satire, his instinctive knowledge of the arts by which men are united and controlled, he now devoted to the cause of the forsaken Protectionists. Though Lord George Bentinck, a son of the Duke of Portland, was the nominal leader of the Protectionists, it was Benjamin Disraeli, and he alone, who was their ruling spirit, and who, like another Bolingbroke, transformed them from a section into a formidable party. The philippics he delivered against Sir Robert Peel on this occasion are among the most brilliant and bitter of the speeches recorded in the pages of Hansard. He was now the most prominent member of the Opposition, and in 1847 was returned as one of the members for the county of Bucks, a shire he continued to represent until his elevation to the Upper House. During the government of Lord John Russell, which succeeded that of Sir Robert Peel, who had been ejected from office by the tactics of the Protectionists, Mr. Disraeli was a keen critic of the domestic and foreign policy of the Whig cabinet, and his damaging strictures contributed not a little to its overthrow. Upon the elevation of Lord Derby to power in 1852, Mr. Disraeli held the seals in the Conservative cabinet as chancellor of the exchequer. The reign of the new ministry lasted but a few months, and upon the defeat of the government on the budget, Lord Derby resigned, and was succeeded by the coalition cabinet of Lord Aberdeen—"All the Talents." The overthrow of the Derby-Disraeli government, as it was called, was due to no faults of maladministration but to the combinations of Whigs and Peelites in the House of Commons, who were determined from the very first not to allow a cabinet which had once opposed the principles of free trade to continue in office. Still, during the few months Lord Derby's cabinet had held power, it had introduced various measures of reform. Its foreign policy had been energetic without being aggressive; whilst its financial schemes, in spite of the hostility they had encountered, offered not a few valuable hints—witness, for example, the reduction of the tea duties—to succeeding chancellors of the exchequer. Owing to the incompetence of the coalition cabinet, and especially to its incapacity in the conduct of the Crimean War, Lord Aberdeen resigned in 1855, and after the refusal of Lord Derby to form an administration, Lord Palmerston was appointed prime minister. Throughout the progress of the Crimean War and of the negotiations which ushered in the treaty of Paris, Mr. Disraeli was the most vigilant of critics, and not an important debate ensued without his taking a prominent part in the proceedings. On more than one occasion his suggestions were accepted by the House of Commons, and led to no slight alteration of the ministerial policy. He condemned the action of Lord Palmerston in the war with China and in the Indian Mutiny, and it was partly the severity of his strictures

upon the conduct of the prime minister in relation to France, by introducing the Conspiracy Bill, which compelled Lord Palmerston to resign in 1858. Lord Derby now for the second time took office, and again Mr. Disraeli controlled the national finances as chancellor of the exchequer. After a brief year of power the Conservative party had to take refuge in the cold shade of opposition, owing to the hostility evinced by the House of Commons towards Mr. Disraeli's reform bill. From 1859 to 1866 Mr. Disraeli was incessant in his criticisms upon the measures of ministers, and his speeches furnish the best comment upon the history of the country during that period. We can here but briefly allude to them. He opposed the various measures for reform that were introduced by Lord John Russell, Mr. Locke-King, and others; he disapproved of the abolition of church rates; in the war in America between the Northern and Southern States he refused to hamper the policy of the government by expressing a sympathy for either side; he objected to the cession of the Ionian Islands; he opposed the course ministers pursued in the Dano-German dispute by encouraging Denmark to expect assistance from England, and then withdrawing from all promises; and next to Mr. Lowe he was the keenest enemy of the reform bill introduced by the government, which he considered unduly favoured the towns at the expense of the counties. Upon the defeat of ministers in 1866 on this question of reform, Lord Russell tendered his resignation, and Lord Derby was once more placed at the head of a Conservative cabinet. Mr. Disraeli was again chancellor of the exchequer. The reign of the Tories was brief, and was characterized by the one great measure which was specially intrusted to Mr. Disraeli—the Reform Bill of 1867, which lowered the franchise, redistributed numerous seats, and greatly increased the number of electors throughout the country. Mr. Disraeli, as reference to his speeches will substantiate, had always been in favour of reform provided the balance between the towns and the counties could be maintained. On this occasion he accorded the amplest concession, without, however, interfering with the equilibrium he considered advisable to preserve. The following year, in consequence of the agitation set on foot by Mr. Gladstone with regard to the disestablishment of the Irish Church, and which met with the approval of the nation at large, Mr. Disraeli, who, on the resignation of Lord Derby through ill health (March, 1868), had been appointed prime minister, found himself in a minority, and after an unsuccessful appeal to the country gave way to his rival. Upon the occasion of his resignation the queen was pleased to raise Mrs. Disraeli to the peerage, by the style of Viscountess Beaconsfield of Beaconsfield. During Mr. Gladstone's tenure of power Mr. Disraeli warmly opposed the measures which the Liberals had pledged themselves to carry—the disestablishment of the Irish Church, the introduction of voting by ballot, and the Irish Land Bill. Conservative hostility was, however, powerless to prevent these bills being recorded on the statute-book; but it was very evident that the Gladstone ministry, by their activity in dealing with home reforms and their disinclination to assert the position of England when the state of affairs in Europe and Asia was about to reopen the entire Eastern question, had alienated a large section of the country from Liberal rule, and paved the path for a Conservative reaction. On the Continent the opinion of England was almost disregarded, whilst at home there was no little irritation among certain classes at what was considered the unnecessary interference of the government in domestic matters. The leader of the Conservative party gave expression to this feeling. "You have substituted the policy of confiscation," said Mr. Disraeli. "You have had four years of it. You have despoiled churches; you have threatened every corporation and endowment in the country; you have examined into

everybody's affairs; you have criticised every profession and vexed every trade; no one is certain of his property, and nobody knows what duties he may have to perform to-morrow." Early in 1874 Mr. Disraeli was restored to power by a general election, and for the next six years the country was under Conservative rule. During this period many important measures became law. The Public Worship Regulation Act was passed to "put down" ritualism; various sanitary measures which had for their object the improvement of the public health were introduced and carried; the shares of the Khedive of Egypt in the Suez Canal were purchased, so as to allow England to exercise a direct influence in the affairs of our highway to India; and the title of Empress of India was conferred upon the queen. But it was the foreign policy that the administration of Lord Beaconsfield maintained which rendered his government so conspicuous in our annals. Under Mr. Gladstone, England, whether justly or no, had acquired the reputation in Europe, of a nation careless as to its prestige provided its commerce extended and flourished. When hostilities broke out between Russia and Turkey, Mr. Disraeli, in opposition to recent Liberal tactics, asserted that no political agreement settling the future of the Ottoman empire could be entered into by the powers of Europe to which England was not an important party. For the safety of our possessions in the East the existence of Turkey was, he said, a necessity, in order to oppose the southern advance of Russia. The vigour of his proceedings, his avowed resolve to maintain those traditions which in former times had established the greatness of the British empire in seasons of general convulsion, his despatch of the English fleet to the Bosphorus, the vote by parliament of six millions of money to carry out military preparations, the bringing a contingent of the Indian army to Malta—all showed that England was in stern earnest not to allow Turkey to be effaced, or the right of nations to be trampled upon. When the question of peace was under discussion the leader of the Conservative party went himself to the congress at Berlin; and it was mainly owing to his opposition and suggestions that the provisions of the treaty of San Stefano were revised. The treaty of Berlin restored "peace with honour," to use the phrase of Lord Beaconsfield. It gave back to Turkey much valuable territory, it endeavoured to secure the independence of the detached provinces, it offered the Porte the opportunity of introducing the necessary reforms within its territories, and it opposed a counterpoise to Russian aggression beyond the Balkans by attaching Bosnia and Herzegovina to Austria. Lord Beaconsfield did not exhibit his customary astuteness by not appealing to the constituencies on his return from Berlin. He permitted months to elapse, during which the conduct of our wars in Afghanistan and South Africa caused a certain revulsion of feeling; and when, in 1880, a general election took place the Conservative party found themselves in a minority, and were ousted from office. After his defeat Lord Beaconsfield did not again come prominently before the country. He died 19th April, 1881. He had been raised to the peerage in the August of 1876 as Earl of Beaconsfield and Viscount Hughenden. The two great features in the political career of Lord Beaconsfield are his patriotism and his fidelity to the Tory principles he always taught and professed. The last words he ever uttered in the House of Commons upon the Eastern question express the foreign policy he consistently upheld:—"What our duty is at this critical moment is to maintain the empire of England. Nor will we ever agree to any step, though it may obtain for a moment comparative quiet and a false prosperity, that hazards the existence of that empire." The Tory party in his eyes was not a section of the nation bent upon certain party interests, but the country itself occupied only in those interests which affected the nation at large. The Tory was an Englishman, and not a

partisan. "The Tory party," he said, "is only in its proper position when it represents popular principles. Then it is truly irresistible. Then it can uphold the throne and the altar, the majesty of the empire, the liberty of the nation, and the rights of the multitude. There is nothing mean, petty, or exclusive about the real character of Toryism. It necessarily depends upon enlarged sympathies and noble aspirations, because it is essentially national." The chief works of fiction of which Lord Beaconsfield was the author are "Vivian Grey," "Coningsby," "Henrietta Temple," "Tancred," "Lothair," and "Endymion." He also wrote a biography of Lord George Bentinck.

BEA'DLE, the messenger or apparitor of a court, who cites persons to appear before it. It is probably in this sense that we are to understand the *bedelli*, or under-bailiffs of manors, mentioned in several parts of the "Domesday Survey." The probable derivation of beadle is from the Saxon *bydelt*, a crier, and that from *bid*, to publish, as in bidding the banns of matrimony. The *bedelli* of manors probably acted as criers in the lord's court. The beadle of a forest was an officer who not only warned the forest courts and executed process, but made all proclamations. Parochial and church beadles were probably employed formerly to announce visitations and to execute other orders of the ecclesiastical authorities, though now employed in less important services. A *bedel*, in the English universities, is one who in processions, &c., precedes the chancellor or vice-chancellor, bearing a mace, and has various ministerial duties to perform.

BEADS (Rosary beads) are made of horn, ebony, ivory, glass, box-wood, and other materials, and are strung in chaplets used by the Roman Catholics for the purpose of counting their prayers. The Rosary is a series of prayers said to have been first instituted by St. Dominic about the year 1200, in honour of the Virgin Mary, and as an invocation to her for spiritual assistance. It consists of a repetition of the Ave Maria and the Paternoster or Lord's Prayer, both in Latin. It is divided into decades of ten Ave Marias, each decade being preceded by the Lord's Prayer, and terminating with the Gloria Patri. The full or great Rosary consists of fifteen decades, but the common Rosary, which is recited generally in the evening by pious Catholics, consists of only five decades. At the end of the five decades they recite the Creed or Symbol of the Apostles, and afterwards (in Italy at least) the Litany of the Virgin, which is different from the Litany of the Liturgy. The Rosary is a daily family evening prayer. The head of the family says the first part of each Ave Maria, and the other members repeat in chorus the remaining part.

The beads are distinguished by their size and shape, those marking the Lord's Prayer being larger than those for the Ave Marias. See AVE MARIA.

BEADS, MANUFACTURE OF. Venice is the chief seat of the manufacture of beads, and about 6000 persons in that city and its neighbourhood earn their living by the various processes incidental to beadmaking, which are for the most part very simple. The chief essential is that the glass, which is manipulated in a semifluid state, should be so tough and ductile as to allow of its being drawn out like rosin or sealing-wax, only to a much greater degree of tenacity.

The glass is coloured before it leaves the furnace by chemicals, of which arsenic, saltpetre, antimony, and lead are the principal. It is then ready to be drawn out into tubes. One of the glass-blowers dips his iron rod into the viscous mass, and taking up a lump about the size of a small melon, first rolls it on an iron plate to round it, and then with a simple tool makes a hollow in it, much like that at the bottom of a wine-bottle. Another workman has meantime done the same thing with another lump; the two then press the edges of these glass balls together until

they adhere, and the fusion is so complete that the air within cannot escape. They then take up their rods again and walk quickly away in opposite directions to a distance of about 100 yards, keeping step the while as exactly as if they were marching with a regiment; the red hot glass spins itself off from the two balls as long as any remains, or until it becomes too cool to spin any further; and as the enclosed air spins itself out at the same time, a hollow tube is produced instead of a solid rod of glass, as would otherwise have been the case, and the future bead has received its necessary hole.

These glass tubes are of various sizes, and range from the diameter of a lead pencil to that of the finest knitting needle. Those which are to be made into variegated beads are formed in the same way, only that the lumps of glass on being taken from the furnace are dipped into liquid glass of other colours in succession, so that they are encased in skins like those of an onion, and the spinning off of the several coats proceeds with wonderful regularity, without any further assistance from the workman's hand. Often, too, the glass balls have merely little knobs of glass of different colours put upon them, and these appear as fine lines or stripes on the tubes. The sorting of the tubes, which are broken into lengths of about 3 feet, is a very general home industry in Venice, where the women and girls are constantly to be seen sitting before large baskets full of glass pipes, which look like the quills of a porcupine.

With outspread fingers they feel and weigh these, until all are accurately sorted according to their size; they are then made up into bundles and taken back to the factories, where they are put into machines exactly like straw cutting machines, and are chopped up into the size required.

The next process is to remove all sharp angles, and to accomplish this the beads are first mixed with fine sand, which fills the holes and prevents their closing up again, and they are then very carefully heated in cylinders, which are kept revolving in the furnace until the beads are sufficiently smooth and round. As far as shape goes the beads are now ready; they are sorted according to their size by being passed through sieves, and then those which are to receive an extra fine polish are put in bags of bran and shaken.

Stringing the beads in skeins is another home industry. The Venetian women, whose occupation it is, hold as many as a dozen steel needles a foot in length, and often as fine as a silk thread, between the fingers of their two hands; and with these they dive into the heap, picking up as many as they can, hap-hazard. It is stated that a skilful pair of hands will thread as many as three millions a day.

The manufacture of the more expensive beads is a much more complicated process than that just described, as they are made only at the blow-pipe. Great mechanical skill is required to produce the tasteful spirals and arabesques which they exhibit, and the effects of colour are often wonderfully beautiful; but the process is as little to be described as that of modelling or chasing.

BEAD-TREE. See MELIA.

BEAGLE, a variety of the domestic dog, belonging to the section of hounds, or a dog trained for hunting by the powers of scent. This dog is of small size, but of great endurance, and was formerly much valued for the pursuit of the hare. A pack of these hounds night, in the days of Sir Roger de Coverley, have been covered by a sheet. But those times are past, and the harrier has now gradually superseded the beagle.

BEAKER, the name formerly given to a cup or drinking bowl. The word is derived from the same root as the German *becher*, namely, the Greek *βίος*, which is believed to be of Eastern origin. It is now almost obsolete, but in Scotland a wooden bowl is still called a "bicker."

BEAM (Ger. *baum*, Dutch, *boom*, a tree). In architecture it denotes any large piece of timber or metal laid across the walls, and serving to support the principal

rafters in a building. In mechanics it is used for any piece supported at one or more points and weighted at others so as to be subjected to a cross breaking strain; and in engineering, for any strong stay of wood or metal used for supporting lateral pressure. In shipbuilding it means the main cross timbers which extend across the hull and prevent the sides from falling together; and in ship measurement it denotes the breadth of a vessel measured amidships. When a ship is thrown so much over on one side that the beams approach a vertical position she is said to be "on her beam ends," and this expression is frequently used to describe any position of great difficulty. In weaving, the cylinder on which weavers wind the warp, and that on which the woven cloth is rolled, are called beams.

BEAMINSTER is a market town in Dorsetshire, situated on the Brit, near its source, $14\frac{1}{2}$ miles W.N.W. from Dorchester and $137\frac{1}{2}$ from London, being 6 miles from the Crewkerne station of the London and South-western Railway. The town is ancient, but most of it having been destroyed by fires in 1644, 1688, and 1781, the houses are chiefly modern and well built. It is very pleasantly situated amongst the beautifully undulating eminences by which it is surrounded. The church, though only a chapel of ease, is large and handsome, with a tower 100 feet high, curiously sculptured. There is an endowed free school, with a good school building, in which 100 boys are educated. The population in 1881 was 2130.

BEAM-TREE derives its name from the use that has been made of its tough wood for beams, axle trees, and similar purposes, where great strength is required. It was especially for the cogs in the wheels of machinery that it was used, till superseded by iron. The common beam-tree is *Pyrus Aria*. It inhabits chalky banks and limestone rocks in England and Ireland, forming an ornamental clump with its dark-green foliage shifting to silvery-white when disturbed by the wind. The leaves of the flower stalk are oval in shape, with eight to twelve lateral veins. See **PYRUS**.

BEAN is the common name for the leguminous genus of plants **FABA**, so extensively cultivated in the garden and in the field.

The Common Bean (*Faba vulgaris*), of which there is but one species, though several varieties, bears a pod containing several oblong rounded seeds, which are used in the soft young state for the table, and in the hard dry state for domestic animals chiefly, either whole or ground into meal.

From the researches of De Candolle it appears that the culture of the bean is prehistoric in Europe, Egypt, and Arabia. It was probably introduced into Europe during the earliest migrations of the western Aryans, viz. the Pelasgians, Celts, and Slavs. It was introduced at a late period into China, about a century before the Christian era; later still into Japan; and quite recently into India. The plant to which the bean is most nearly allied is *Vicia narbonensis*, which grows wild in the Mediterranean region, and the East as far as the Caucasus, North Persia, and Mesopotamia. The bean itself is extremely rare in the wild state, but probably had at one time much the same distribution as this *Vicia*; it has been found in the region south of the Caucasus, and De Candolle considers North Africa as another centre of its spontaneous growth.

The cultivation of beans in the kitchen garden may advantageously be first considered. Magazan and White-blossomed Beans may be sown in light sandy soils in January for early crops, along with other sorts for later crops. The magazan may be planted in June for the last crop of the season. Beans are improved both in earliness and productiveness, although not enlarged in size of pod, by being transplanted. For this purpose they are sown in pots, or on a bed upon pieces of turf. In March they are taken up carefully, so as not to injure

the roots, and placed 6 or 8 inches apart in drills, which should be driven 3 inches deep, and at a distance from one another of 4 or 5 feet. For a few days they should be protected with branches, and afterwards earthed up as they require it. In May it will be proper to begin topping those beans that are in flower, to promote the free setting of the pods. This should be particularly attended to in the early crops, for it will not only make them swell faster, but will forward them into fruit at least a week sooner than those which are allowed to run, for having no advancing top to nourish, their whole strength goes to the nourishment of the fruit. The stems should be, however, allowed to advance to such a height as to have a sufficient quantity of pods. As the magazan beans stand the winter well, they are often sown in October for an early crop next May. In the field the Tick Bean, the common Horse Bean, and the small Dutch or Heligoland Bean are preferred, being handy as well as productive. The Winter Bean, introduced into England in the present century, is very hardy, and though objection is made to it on account of the shortness of the straw, it ripens much earlier than the varieties own in spring, and is therefore in many cases preferable.

The soil best adapted for beans is a rich strong loam, such as produces good wheat. In such a soil the produce is sometimes 50 or 60 bushels per acre. By cultivating the beans in rows, and by careful hoeing and manuring, alternate crops of wheat and beans may be raised for many years; but it is now more customary to grow turnips or other crops, so that beans shall come only once in four or even six years, and certainly on poor soil this is necessary. The beans are drilled or set in rows, with intervals of from 11 to 27 inches between the rows, and the intervals must be repeatedly stirred and hoed so as to prevent the growth of weeds. Sowing in narrow rows is preferred in England. Immediately after bean harvest the land is scarified, or skimmed over with a plough having a very broad share. All roots of weeds and the remains of bean-haulm are collected and burned, or put in a heap with quicklime to be converted into manure. The ground is then ploughed once or several times, according to circumstances, and wheat is sown about the month of October. The wheat which follows beans is generally good and heavy, and seldom runs to straw. After wheat-harvest the stubble is ploughed up and turned in with a very deep furrow; the land is harrowed flat, and a good coating of manure is put on in a moderately rotten state, and this is covered with a shallow ploughing; the land is well water-furrowed and left so till spring, when the beans are drilled in the mellow surface produced by the winter's frost.

In cold wet soils beans require great care to insure good crops. Although they will grow well and seem to flourish in the stiffest and most unsuited clays, they will seldom produce much at harvest, unless the land has been well prepared and the cultivation managed with skill. The bean, by its strong and penetrating root, opens the stiff soil to the influence of the atmosphere, by which the surface is dried and at the same time mellowed. Although the nutritious matter in a good crop of beans is great, and almost equal to that obtained from a crop of wheat, it exhausts the soil much less; its succulent stems and leaves absorb much nourishment from the atmosphere, and the latter, falling off and decaying, restore carbon and manure to the soil, and make up for the inferior quantity of manure produced by the bean-haulm in comparison with wheat straw. There is perhaps no crop-bearing seed which gives so great a return with so small an expenditure of the nutritive juices of the soil, and certainly none that repays manure better, or leaves the land in a better condition for wheat or oats.

The principal use of beans is to feed horses, for which purpose they are admirably adapted, and far more nourishing than oats. They should be bruised or split in a mill,

and given to horses mixed with hay and straw cut into chaff. Great quantities of beans are consumed in fattening hogs, to which they are given whole at first, and afterwards ground into meal. Bean-meal given to oxen soon makes them fat, and the meat is far better than when oil-cake is used for that purpose; mixed with water and given as a drink to cows, it greatly increases their milk. Professor A. H. Church, in considering the food value of beans and pease, says:—"There is a marked difference in chemical composition between the seeds of leguminous plants on the one hand, and the grain of cereals on the other. This difference mainly consists in the far higher proportion of albuminoids or flesh formers in the former. In consequence of this difference the ratio of flesh-formers to heat-givers in the seeds now under consideration is about 1 to 2½, instead of 1 to 5 as in wheat, or 1 to 10 as in rice. This fact suggests the proper mode of using pulse, which should generally be eaten with other foods rich in starch, sugar, fat, oil, or non nitrogenous nutrients. Beans and rice, beans and bacon, are examples of such mixtures."

The French Bean, Kidney Bean, or Haricot Bean (*Phaseolus vulgaris*) is chiefly cultivated for its tender and succulent pod, being one of the most esteemed vegetables for the table. As an esculent vegetable it is wholesome and nutritious in a fresh state, and may be readily preserved for winter store or sea voyages by salting in casks. The dried seeds are also boiled after being soaked in water for some time, and are thus used very extensively by the French. The best soil for haricot beans is a rich mellow loam, rather light than otherwise, but provided the ground be well stirred they will grow in any soil. They may be planted in rows, the dwarf sorts at 2½ or 3 feet distance, the runners at 4 feet. When they are somewhat advanced in growth the runners may have sticks to climb upon.

The Scarlet-runner (*Phaseolus multiflorus*) is used green, like the French bean; the ripe seeds are not wholesome.

The Lima Bean of America is *Phaseolus lunatus*; the Carob Bean or Locust of the Mediterranean is *Ceratonia siliqua*; the Ox-eye Bean is *Mucuna urens*; the Sweet-scented Tonka or Tonquin Bean is *Dipteris odorata*; the Calabar Ordeal Bean is *Physostigma venenum*. There are various so-called "beans" which do not belong to the order LEGUMINOSÆ; such are the Sacred, Egyptian, or Pythagorean Bean (*Nelumbium speciosum*), and St. Ignatius' Beans (*Strychnos multiflora*). The BUCK-BEAN or Bog-bean is *Menyanthes trifoliata*.

According to the official agricultural statistics published in 1882, the number of acres devoted to the growth of beans in the United Kingdom in that year was 460,000—England, 420,000; Wales, 3000; Scotland, 25,000; Ireland, 10,000; Isle of Man and Channel Islands, 300. The quantity of beans imported into the United Kingdom in 1882, chiefly from Egypt, was 3,519,550 cwt.

BEAN GOOSE (*Anser segetum*) is the most common wild goose found in the British isles. It is a winter visitant, arriving in large bodies from its northern summer haunts during September or at the beginning of October, and departing about the end of April. A few, however, remain through the summer to breed in Scotland, and even in the north of England. They are found abundantly throughout northern Europe and Asia, and breed freely in Greenland. Their flight, except during stormy weather, is generally at a great elevation and extremely rapid. The birds fly either in a diagonal line or form two sides of an acute triangle, and during their aerial progress maintain an incessant cackle, the voices of the two sexes being easily distinguishable. During the day the flocks resort to the upland grounds and open lands, and feed on the tender wheat, and also on clover and other herbage. In the early part of the spring they visit such fields as are newly sown with beans and pease, and greedily devour as much as they may find scattered about or can dislodge. From this fondness for

pulse and grain they have acquired their name. On the approach of evening they retire to the water, or to some bar of sand at a little distance from the shore, where they have a free range of vision all around, and no enemy can steal unobserved upon them.

The bean goose is one of the largest of the British native species. The bill is long and of an orange-red tint, with



Bean Goose.

the exception of the terminal nail, which is black. The plumage is gray, the legs black. The wings extend even beyond the tail. The nest is made in marshy grounds, and consists of a mass of dried herbage; the eggs are usually about ten or twelve in number.

BEAR (Ursidæ) is the name of a family of CARNIVORA distinguished by their heavy gait, ponderous bulk, and massive limbs. Of all the Carnivora they are the most indiscriminate in their diet, the greater part of their food, however, being of a vegetable nature. They are provided with claws which are not retractile, but long, curved, and robust, and are well adapted for digging and climbing. They inhabit caves, the hollow trunks of trees, the deep recesses and gorges of the mountains, and the depths of trackless forests. Most of the family have the habit of hibernating, and it is during this season that the young are produced. Though of a clumsy form they are admirable climbers, ascending the trees in search of the wild bees' nests, for their partiality to honey is remarkable.

Their flesh is wholesome, the fat white and sweet, and the hams, in North America especially, are valued as an excellent dish for the table. The skin is utilized by man in various ways, and the grease largely employed by perfumers and mechanics.

The bear belongs to the plantigrade division of the Carnivora—that is, it walks with the sole of its foot on the ground, instead of on its toes like the cat. Each foot has five toes. The teeth are forty-two in number, and, as might be expected, do not exhibit the ordinary carnivorous characters. The canines are comparatively smaller than in the cat family; the molars, and especially the carnassial teeth, have lost their sharp cutting edges, and become flattened and covered with small tubercles.

There are several species of this extensive family, which are distributed throughout Europe, Asia, and America. Few bears exist at present in the African continent, though at one time they were undoubtedly more numerous; those which still linger are confined to the region of the Atlas, and perhaps to the Abyssinian highlands.

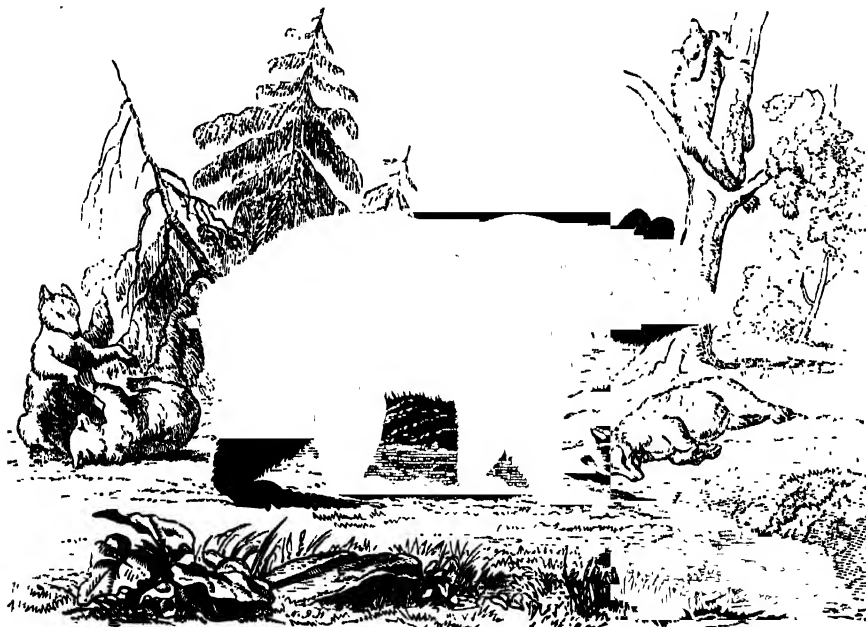
Dr. Gray, in a monograph of this family, has divided the Ursidæ into Land Bears, Sea Bears, and Honey Bears.

1. *Land Bears*.—The Brown Bear (*Ursus arctos*) is found in all the mountain districts of Europe, from the shores of the Polar Sea to the Alps and Pyrenees; while in Asia its habitat extends over Siberia, Kamchatka, Japan, and the Himalayan range. It is remarkable that from long

sojourn among the snows of the Himalayas the fur has acquired here a tawny colour, which led to its being described as a distinct species under the name *Ursus isabellinus*. In earlier times it was an inhabitant of the British isles, whence it was exported to Rome to swell the victims of the Circus.

It is on an average about 4 feet in length by about 2½ feet in height. As the name indicates, the general colour of the fur is brown; but its tint varies greatly according to the animal's habitat, and also according to its age. When young the hair is of a woolly texture, but that of the adult bear is firm and even. In all the young European specimens a pale-brown collar is observed round the neck; in the Siberian variety this pale brown is changed into white.

The common brown bear, like all the members of his family, is stoutly made, and provided with thick powerful limbs. His forehead is slightly convex, while the ears are short. His habits are solitary. His flesh is excellent eating, and his fur is of great benefit to the inhabitants of the colder regions of Europe and Asia, whom it provides with all the necessaries and even the comforts of their lives. The skin forms their beds and their coverlets, bonnets for their heads, gloves for their hands, and collars for their dogs; while an over-all made of it, and drawn over the soles of their shoes, prevents them from slipping on the ice. The flesh and fat are regarded as dainties. Of the intestines they make masks or covers for their faces to protect them from the glare of the sun



Brown Bear (*Ursus arctos*).

in the spring, and use them as a substitute for glass by extending them over their windows. Even the shoulder-blades are said to be put in requisition for cutting grass. This bear hibernates, seeking out when the summer is gone a cave or hollow tree, and remains there dormant till the advent of spring. During all this time no food is taken, life being sustained by drawing on the store of fat which has been accumulated during the summer. At its reappearance the animal is very lean and weak, but soon recovers its former vigour. The brown bear is in the main a vegetarian, living on fruits, berries, and the like; nor are the stings of angry bees sufficient to prevent him from indulging in his passion for honey. He is also known to prey upon ants. Some of the smaller mammals fall victims to his "hug," but he seldom attacks man unless provoked. The female, when the safety of her cubs is threatened, becomes a very formidable antagonist, so much so that no hunter who understands his craft will kill a cub in the sight of his mother. The method of attack employed by this bear is well known. It raises itself on its hind legs, and, clasping its opponent tightly with its fore limbs, hugs him to death.

The strength of the brown bear is prodigious. He has been observed walking on his hind legs across the rude support afforded by the trunk of a tree, and carrying in his arms the body of a dead horse. His well-developed sole, and the form of his hinder limbs, enable him to

walk erect with considerable facility for a comparatively long period, and sustaining heavy burdens. For the same reason he can be taught to assume grotesque attitudes, and even to dance. When the band plays in our Zoological Gardens the large brown bear may be seen clumsily moving backwards and forwards in his den, keeping time with the music. In the northern wilds he attains to a great size, his weight frequently amounting to 500, and in some individuals to 700 lbs. He swims well and fast, and during the summer heats often takes to the water for the sake of a bath. The period of gestation is seven months. The young never exceed three in number; they are born in January, and at first are not much larger in size than puppies; their eyes are closed, and they remain blind for about a month.

The Siberian Bear (*Ursus collaris*) is a variety of the common brown bear, from which it is distinguished by the ornament of a large whitish collar, passing over the upper part of the back and shoulders, and terminating on the breast.

The Syrian Bear (*Ursus syriacus*), probably only a variety of the brown bear, is found on the mountains of Eastern Turkey and the Caucasus as well as in Syria. This is the bear mentioned several times in the Bible. The fur is of a yellowish-brown tint.

Closely allied to the European brown bear is the Barren Ground Bear of America (*Ursus arctos Americanus*), which

resorts to the Arctic seas in the month of August, and preys indiscriminately upon animal and vegetable food. Sir J. Richardson describes it as inhabiting the barren lands which lie to the north and east of the Great Slave Lake, and extend to the Arctic Ocean. "It differs," he says, "from the American black bear in its greater size, profile, physiognomy, larger soles, and tail; and from the grisly bear in colour and the comparative smallness of its claws. Its greatest affinity is with the brown bear of Norway, though its identity with that species has not been established by netral comparison. It frequents the seacoast in the autumn in considerable numbers, for the purpose of feeding on fish."

The American Black Bear (*Ursus Americanus*) is found in all parts of North America. It seldom exceeds 5 feet in length. It has a long head, pointed nose, small eyes, and short round ears, with thick, strong, and clumsy limbs; it has a short tail, large feet, and its limbs and body are covered with a glossy black fur.

The black bear becomes torpid during the winter, usually selecting for his *hibernaculum*, or winter retreat, some large hollow log, or a cavity beneath the root of a prostrate tree. In the southern states of North America he is an unwelcome visitor, on account of his depredations in the maize fields. When the corn is in that milky state called "roasting ears," so prized for boiling and eating as a table dish, like green peas, or roasting whole on the cob, the



American Black Bear (*Ursus Americanus*).

bear's taste appears to be in harmony with that of man, and he devoutly and treads down a large quantity, as he finds no difficulty in climbing wall, hedge, or fence. It is said that he will nightly visit the same field, always mounting the hedge or fence at the point where he got over the first time. The planters take advantage of this singular habit, and fasten to the fence a heavily-loaded gun, at such an angle as to point at the bear's breast when he rises on his hind legs. The identical crossing place is known by his great tracks in the soft earth. A stick is attached to the trigger, and this made fast at right angles to a transverse stick resting on two forks, about breast high, a few inches outside the fence. The bear rears up to put his fore paws on the rail, and in getting over presses with his breast against the transverse stick, which drives back the trigger, and the trespasser is instantly punished for his dishonesty. Like most of his family he feeds chiefly upon roots and other vegetable substances, but has been accused of a liking for pork, which leads him to make ravages on the farm-yard. In the winter time the female of this species gives birth to her young, varying from one to five in number. To secure them from the attacks of other animals, she makes her lodging high up among the branches of thickly-wooded trees.

At the beginning of the nineteenth century large numbers of these bears were killed for the sake of their furs, and in 1803 as many as 25,000 skins were imported into England. The imports now, however, have greatly decreased.

The Grisly Bear (*Ursus ferox*) is also an American species. It is about 9 feet long, and though of immense strength and unwieldy figure, is capable of great rapidity



Grisly Bear (*Ursus ferox*).

of motion. Of its muscular power a notion may be obtained from the fact that it has been seen to carry the carcass of an American buffalo, weighing about 1000 lbs., to a considerable distance. It proves a very formidable antagonist, and is the only bear which will attack man unprovoked. The limbs are powerful, and the feet armed with very long, compressed, white, and strongly-curved claws, better adapted for digging and burrowing in the ground than for climbing trees. The head is broad and flattish on the crown, and from nose to occiput nearly even; the ears are short and conical; the muzzle is long, wide, and of a pale colour. The fur is long, and of a dark-brown tint, it is rather coarse and shaggy. The hair entirely conceals the animal's rudimentary tail.

The grisly bear is more carnivorous in his habits than any of his congeners; but if he cannot obtain animal food, contents himself with a vegetable diet. His flesh is of inferior quality, and he is therefore seldom pursued by the hunters, who find him a particularly formidable opponent. These bears hibernate during the winter months, like the rest of the family, but the old males occasionally steal forth in search of food.

The Malayan Sun-bear (*Helarctos malayanus*) is found



Bornean Sun-bear (*Helarctos Euryspilus*).

in the Malayan peninsula, Borneo, Sumatra, and Java. The fur is jet black, with a white heart-shaped patch on the breast. In the Bornean variety this patch is of an

orange colour. The sun-bears are distinguished by the length and flexibility of the tongue, and the power of considerably extending the lips. They are of docile habits and easily tamed. Sir Stamford Raffles, when in Java, had a tame sun-bear who "was brought up in the nursery with the children, and when admitted to my table, as was frequently the case, gave a proof of his taste by refusing to eat of any fruit but mangosteens, or to drink of any wine but champagne." He is called the Sun-bear from his partiality to bask in the sunshine. The Malays name him *Bruang*.

The Spectacled Bear (*Ursus ornatus*) is considered the nearest ally of the Malayan Sun bear. It is so named in allusion to the two semicircular yellow marks extending from the nozzle and overreaching either eye. Its fur is smooth, black, and shining. It inhabits the Andes of Chili.

2. *Sea Bears*.—The Polar Bear (*Thalassarctos maritimus*) is one of the largest and most formidable members of the Urside. His fur is as white as the frozen snows among which he lives, except the tip of the nose and the claws, which are jet black. He is both a skilful hunter and an admirable angler; he traps the seal with singular ingenuity, and hares and birds can with difficulty escape his toils. On catching sight of a seal, he glides softly into the water, and swims until he gets to leeward of his intended prey; then, by frequent short dives, he stealthily shortens the distance between them, until, after the last dive, he comes up close to the spot where the seal is ignorantly basking. If the poor animal attempts to escape by rolling into the water, he falls into his pursuer's clutches; if, on the contrary, he retains his position, the bear makes a powerful spring, kills him on the ice, and devours him at leisure.

From necessity the polar bear is almost wholly carnivorous, but the structure of his teeth departs as much from the typical carnivorous characters as in the rest of the family. To enable him to walk the more securely on the slippery ice the soles of his feet are covered with coarse hairs. The body is more cylindrical than that of the land varieties of bear; the head is likewise rather more elongated; the ears are short. The muzzle is somewhat curved, the mouth being comparatively small, while the neck is long and thick. The claws are short, only slightly curved, and nearly concealed by the fur. The size attained by the polar bear is very considerable, some individuals attaining the length of 9 feet.

During the brief Arctic summer this bear lives on the ice islands which drift across the polar waters, and swims from one to another with a really surprising dexterity. Captain Sabine states that he saw one about midway between the north and south shores of Barrow's Straits, which are 40 miles across, though there was no ice at hand where he could repose himself. On shore the animal's pace is a shuffling kind of walk, but of considerable quickness.

The male polar bear does not hibernate, nor does the female except she is pregnant. She then retires at the approach of winter to some deep frozen gorge, or cavern concealed among the ice and snow, where she brings forth her cubs about the latter part of December, quitting her lair with them early in March. The white bear is not less devoted to her young than her brown congener, and rat than abandon them she will heroically endanger her own life. See PLATE BEAR.

3. *Honey Bears*.—The Sloth or Honey Bear (*Melursus labiatus*) is an awkward unwieldy animal, a native of the hilly and mountainous parts of India, where he dwells in caves, and feeds upon fruits, honey, and termitæ ants. He is very robust, with short massive legs and long shaggy hair, the colour of which is black, with a crescent-shaped patch of white on the breast. The back is arched, the muzzle greatly elongated, and the lips, extremely flexible, project at all times considerably in front of the jaws.

A distinctive character of the honey bears is the absence of the two upper incisors, reducing the total number of teeth to forty.

The bear has always been an object of superstitious reverence among its hunters in the northern regions. The Laplanders regard a bear hunt almost in the light of a religious ceremony, chanting odes to their intended victim, and asking his pardon for their persecution. The Siberians consider the bear to be a fallen man, capable at times of



Sloth Bear (*Melursus labiatus*).

resuming his original shape. By the Aino and other tribes living on the banks of the Amoor the bear is worshipped as a god. Their reverence for their deity does not, however, prevent these savages from sacrificing him, and eating his flesh and drinking his blood at their religious festivals, which usually degenerate into a brutal orgy. The Red Indians show the same respect for the American black bear. When an animal has been killed they take the head in their hands and repeatedly stroke and kiss it, begging the creature a thousand pardons for taking away his life, calling him their relation and grandfather, and blowing tobacco-smoke into his nostrils by way of appeasing his offended manes.

Bear-baiting in former days was a favourite sport in many places of Great Britain, and indeed throughout Europe. See BEAR-BAITING.

Bears have not been found in any deposits of greater antiquity than the Pleiocene age. The difficulties in the way of a correct classification of the fossil bears, owing to the great variations in form, have led to an enormous number of species being described. Four distinct species inhabited Britain:—1, *Ursus arvernensis*; 2, the Cave Bear (*Ursus spelæus*); 3, *Ursus priscus*; 4, the Common Brown Bear (*Ursus arctos*).

Ursus arvernensis is abundant in the Pleiocene beds of Anvergne in France. It is also found in the forest-bed of Norfolk. It had a southern range, inhabiting Northern Italy, France, and Southern Britain. All the remains that have been found show that it was a creature of comparatively small size, and armed with insignificant canines.

The Cave Bear (*Ursus spelæus*) has been found chiefly in cave deposits, associated with the mammoth, reindeer, cave hyæna, and other animals in Germany, France, Britain, Belgium, and Lombardy, and even in South Russia. Professor Boyd Dawkins is of opinion that it migrated to Europe during the glacial period from a comparatively temperate region, probably Southern Siberia. It was the largest of its family, either living or extinct. It has been found in the cave at Wooley Hole, near the Mendips, Somersetshire. In this cave the bones of the cave hyæna are much more abundant than those of any other animal. In Kent's Hole, near Torquay, the bones of the cave bear have been found in company with those of the cave hyæna, rhinoceros, fox, deer, horse, &c. With these have been also found numerous implements of flint and stone and a portion of a human jaw. Amongst other caves in which remains of the cave bear have been found may be

mentioned one near Aray in France. Here in the lowest beds were found bones of the cave bear, and in contact with them a human jaw with two molar teeth. All this is part of the evidence that man existed in Pleistocene times, and was contemporary with the cave bear.

Ursus prisus is considered identical with the grisly bear (*Ursus ferox*). Its range in Europe almost coincides with that of the cave bear. It is found in England both in caves and river deposits.

The Common Brown Bear (*Ursus arctos*) also inhabited Britain in the post-glacial age, though there are only slight traces of its existence till prehistoric times. Its remains have been found, together with bones of the red-deer, horse, and Celtic shorthorn (*Bos longifrons*), and human implements of the Neolithic age, in the Victoria Cave, near Settle in Yorkshire.

Though its bones have been discovered in Longford and King's County, it probably became extinct in Ireland before historic period. If statements made by Martial and Plutarch, it would seem that the brown bear existed in abundance in the forests of Britain during the Roman occupation. The exact date at which it became extinct here is doubtful, but it was probably some time in the eleventh century. It is said that the last British bear was killed in Scotland in 1057 by one of the Gordons, in token whereof he was allowed by the king to assume upon his banner the device of three bears' heads.

BEAR (written also *berc* and *beor*), a popular name for barley (Hordenn). See **BARLEY**.

BEAR, verb, to carry, derived from the Saxon *beran*. The word used to be written *berc*. The participle was of old, and indeed still is, employed for personal dignity. Thus Chaucer, in the "Rime of Sir Thopas," says—

"But faire escaped child Thopas,
And all it was through Goddes grace,
And thurgh his faire *bering*."

BEAR, GREAT and LITTLE (the Constellations). See **GREAT BEAR**.

BEAR LAKE. The great sheet of water to which the name of the Great Bear Lake has been given is situated in the N.W. part of North America, on the Arctic circle. Its shape is very irregular, the entire lake being formed by five or bays which have a common centre. The longest diameter of the lake from Fort Franklin, which is on the S.W. extremity, in 65° 12' N. lat., and 123° 13' W. lon., to the N.E. part of Dease's Bay, is about 172 miles. The diameter, taken from the western shore of Smith's Bay to the eastern shore of McTavish Bay, is rather more than 138 miles. The total area has been estimated at 14,000 square miles. The depth is very great. The water, which appears of a light blue colour, is so transparent that a piece of white rag let down into it was visible at the depth of 90 feet. The principal stream which flows into it is Dease's River, which falls into the N.E. arm of the lake. The Bear Lake River flows from the S.W. arm into the Mackenzie River, which it enters at right angles. The lake contains great quantities of fish. Its surface is about 200 feet above the sea-level, and is covered with ice and snow about 252 days in the year. As the lake maintains its level during the winter, though there is a constant discharge through the Bear Lake River, and the superficial supplies are cut off by the frost, it is clear that the chief supply is from subaqueous springs at a greater depth than the frozen soil descends to.

BEAR-BAITING, a cruel sport, consisting of worrying a chained bear by mastiffs trained for the purpose, which was very popular in former times in most countries of Europe. In England such exhibitions were thought suitable entertainments for royalty, and it is recorded that Queen Elizabeth was very partial to them. The places where bears were kept for this form of sport were termed

bear-gardens, and the term is still used to describe a scene of brawling and confusion. The practice continued in vogue until a comparatively recent period, and among the writings of Sydney Smith is to be found a paper in which he ridicules the efforts then being made to suppress it as cruel and brutalizing. It was prohibited by Act of Parliament in 1835, and is now, with the kindred sport of bull and badger baiting, happily extinct in England.

BEAR-BERRY is the common name of the genus *Arctostaphylos*. The plants belonging to this genus are trees or shrubs, and are very nearly related to *Amniens* (the strawberry tree). Both genera belong to the order *ERICACEÆ*, or heath family. The bear-berry agrees with *Arbutus* in the calyx and corolla, being five-lobed, and the ten stamens having anthers with pores and two awns on the back, but differs from it in its smooth fruit having only

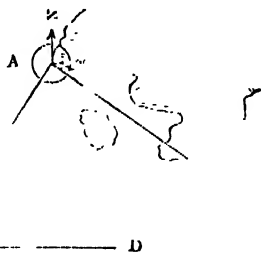
one seed in each of the five cells. There are two species found in the British Isles—*Arctostaphylos Uva-ursi*, the common bear-berry, and *Arctostaphylos alpina* (in Scotland only), the black bear-berry; and these two species are found generally throughout the colder parts of the northern hemisphere. There are thirteen other species, which are peculiar to Mexico and California. The common bear-berry possesses astringent and diuretic properties. The leaves are the part of the plant which is used. These are destitute of smell, but have an astringent bitter taste. Grapes are very fond of the berries.

BEARD. The fashion of the beard has varied greatly in different times and in different countries. The earliest notice of attention to its growth is probably in Leviticus, where the lawgiver to the Jews (chap. xix. 27) says—"Thou shalt not mar the corners of thy beard." Generally speaking, the growth of the beard was cultivated among the nations of the East, although it must be observed that most of the Egyptian figures in the ancient paintings are without beards. The figures on the Babylonian cylinders are usually represented with beards, and also those on the reliefs from Persepolis in the British Museum. Athenians observe that the Greeks wore their beards till the time of Alexander. The Greeks continued to shave the beard till the time of Justinian, under whom long beards came again into fashion, and so continued till the taking of Constantinople by the Turks in 1453. The Greek philosophers usually made the beard a distinguishing feature in their appearance. Varro and Pliny say that the Romans did not begin to shave till the year of the city 451, when Publius Titinius Mena brought over barbers from Sicily. The first day of shaving among the Romans was subsequently considered as the entrance upon the state of manhood, and was kept with festivities like a birthday. Augustus and the Roman emperors his successors, till Hadrian, shaved, as appears by their coins. It would require no small space to enter minutely into the history and vicissitudes of the beard among the nations of modern Europe. The Lombards, or Longobardi, derived their name entirely from its length. The ancient Britons, according to Caesar, wore no beards except upon the upper lip. The Anglo-Saxons, on their arrival in Britain, and for a considerable time after, wore beards. The Normans, indeed, not only shaved their beards themselves, but, when they became possessed of authority, they obliged others to imitate their example. In the Bayeux Tapestry both Saxons and Normans are shaven, this foreign custom having been introduced by the half-Norman Edward (the Confessor). The English, however, retained the mustache, and meanwhile the Normans had carried the fashion further, and were shaven at the back of the head at the time of the Conquest. In the higher classes of society the beard, in a greater or less degree, was encouraged by the English for a series of centuries, as is evident from the sepulchral monuments of our kings and chief nobility, and from portraits where they remain. It was the custom in the middle ages for the sovereign to add

greater sanction, when sealing his mandates, by embedding three hairs from his beard in the wax; and there is still a charter of 1121 extant which contains in the execution clause words recording that the king had confirmed it by placing three hairs from his beard in the seal. In the time of Elizabeth a yearly tax of 3*s.* 4*d.* was imposed upon all who wore a beard of more than a fortnight's growth; but it was received with such general disfavour that it was never enforced. During her reign and that of James I. beards were worn of the most varied and fantastic cut, and beards of different shape were appropriated to different characters and professions. During the reign of Charles the wearing of the beard gradually declined. After the restoration of Charles II. moustaches and whiskers continued for a time in fashion, but subsequently the custom of shaving the whole of the face prevailed, not only in England, but throughout Europe, and this continued till the middle of the present century. Since then the practice of wearing the beard has become more common, and every man may now follow his own inclination in the matter without exciting attention. It has been pointed out by physicians that the presence of the beard is a protection to the throat and chest; and sailors, policemen, and soldiers on foreign service are permitted to grow their beards.

BEARING, the direction of the line drawn from one point to another, is a term usually applied to the points of the compass, as follows:—If the line *AB* be in a N.W. direction from *B*, *A* is said to *bear* N.W. of *B*, or the *bearing* of *A* is N.W. To take *bearings* is to ascertain the points of the compass on which objects lie. The following example will serve to show how the distances of a ship from any two points may be found by the observed bearings of those points:—

Cape *B* is twenty miles from Cape *A*, and bears S.E. of it. On board a ship, *S*, Cape *A* is observed to bear N.N.E., and *B* bears E. by N. required the position of the ship. Draw *SB*, *AC*, both east; then the angle *BSB* is one point of the compass, and the angle *BSA* six points; consequently *ASB* is five points of the compass, or $56^{\circ} 15'$; but *CAS*



and *ASD* are together equal to two right angles, or sixteen points, of which *ASD* is six points, therefore *CAS* is ten points; but *CAB* is four points; therefore *SAB* is six points, or $67^{\circ} 30'$; therefore, in the triangle *ASB* the side *AB* and two angles are known, whence the other sides, or the ship's distance from the two capes, can be found. The easiest method of solving this problem is by actual construction, the results being generally as accurate as the data.

In a manner somewhat similar the distances of a ship from a headland may be found by observing its bearings at two different hours of the day, knowing the course or bearing of the ship's path and the distance sailed in the intermediate time. If all the bearings are observed by compass the magnetic variation need not be allowed for, because all the bearings are equally affected by it; but if one bearing or more be taken from a map, then the observed bearings must be corrected. See **AZIMUTH, COMPASS**.

BEARING THE BELL, a phrase which signifies taking the lead or carrying off the prize in any pursuit. It dates from the beginning of the seventeenth century, when a small golden or silver bell was given as a prize to the winner of a horse race.

BEATIFICATION, an act by which the pope and cardinals permit a "servus Dei," i.e. an individual who died in good repute as a virtuous and holy man, to be venerated, and his image to be placed on the altar within the limits of some diocese, province, or town, or within the houses of the religious order to which the deceased belonged, defining at the same time the peculiar mode of veneration allowed, by prayers, masses, &c., until he be duly canonized as a saint. Amongst the most recently "beatified" persons are Sir Thomas More and Cardinal Fisher, of Henry VIII.'s time, who both received this honour at the hands of Leo XIII. in 1883. Beatification is preliminary to canonization, but not all the beatified become saints. Both processes are under the authority of the cardinals sitting as a Congregation of Rites, but in beatification the personal wish of the pope is allowed much greater weight.

BEATING AND WOUNDING. See **ASSAULT**.

BEATING THE BOUNDS. This custom, which is still carried out in some English parishes, although generally at rare intervals, instead of annually, as formerly, is as follows:—On Ascension Day the parish clergyman, churchwardens, and other parishioners, with the boys of the parish school, go in procession round the boundaries of the parish, which boundaries the boys beat with willow sticks as they go. It is supposed that the impression made on the boys' minds by this singular ceremony will enable them, by their evidence, to preserve intact the parish bounds.

BEATON, CARDINAL DAVID, Archbishop of St. Andrews and lord high chancellor to Mary, queen of Scotland, was a younger son of John Beaton or Bethune of Balfour, in the shire of Fife, and nephew to Bishop James Beaton, lord chancellor to King James V. He was born in 1491, and on the 26th October, 1511, matriculated at the University of Glasgow, whence he was sent to France to study the civil and canon laws. In 1519 he was appointed resident for Scotland at the French court, and in 1523 his uncle, now translated from Glasgow to the primacy of St. Andrews, resigned in his favor the rich monastery of Arbroath *in commendam*. In February, 1533, Beaton, now prothontary apostolic, was sent ambassador to France, with Secretary Erskine, to treat of a league with that crown, and also of a matrimonial alliance between James V. and the Princess Magdalene. On Queen Magdalene's decease he was joined in an embassy to the house of Guise, to treat of a match with Mary, widow of the Duke of Longueville. It is probable that when in France on this occasion he procured the papal bull of the 12th February, 1537, for the erection of St. Mary's College at St. Andrews. On his return home he was made coadjutor in the see of St. Andrews, and successor to his uncle, who, being now much advanced in years, devolved on him the charge of church affairs. On the death of his uncle in the autumn of 1539 he was fully invested in the primacy of St. Andrews, the privy seal being bestowed upon the Bishop of Dunkeld.

On the 20th December, 1542, James V. died, leaving an infant daughter eight days old heir to the throne, and Beaton produced a testament, which he affirmed was subscribed by his Majesty, appointing him regent of the kingdom and guardian to the infant queen Mary. The document was a base forgery, and James, earl of Arran, next heir to the queen, succeeded to the regency; but Beaton not only got the nobles to accede to his views of government, but also induced the timid regent publicly to abjure the doctrines of the Reformation.

In December, 1543, the great seal was taken from the Archbishop of Glasgow and bestowed on Beaton, whom Pope Paul III., by bull of the 30th January following,

constituted his legate *à latere* in Scotland. He opposed the designs of Henry VIII. for the marriage of Mary to his son Edward, and when the Earl of Herford invaded Scotland in 1544 we find him communicating to Henry a design by Wishart and others to seize or slay the cardinal could they secure his Majesty's protection and support.

Beaton was hughty to all, but to the reformers he was particularly oppressive. In the beginning of 1545-46 he held a visitation of his diocese, and had great numbers brought before him, among whom was George Wishart, who was condemned for heresy, and adjudged to be burned. After having been present at the marriage of his illegitimate daughter to the Earl of Crawford at the Abbey of Arbroath, he returned to St. Andrews, where, on Saturday, 29th May, 1546, he was put to death in his own chamber by a party of reformers headed by Norman Leslie, heir of the noble house of Rothes, who, on private grounds, had a personal quarrel with the cardinal.

Beaton left behind him six illegitimate children, three sons and three daughters.

BEATS is the name given to those throbs or pulses of sound which occur, separated by intervals of comparative silence, when two sounds of nearly the same pitch are produced simultaneously. In the article **INTERFERENCE** will be considered the effect of simultaneous sounds of the same pitch on one another; and it will be shown how the resulting tone may by proper adjustment be varied in force from four times the force of the single sound down to absolute silence, provided the two sounds are of equal intensity. But if the sounds are nearly though not exactly of the same pitch, no adjustment short of alteration of pitch can prevent the well known rattle of *beats*. If, like the pianoforte tuner, we have the power of altering the pitch of one or both of the notes, we find that as we bring one nearer to the other the beats decrease in rapidity until it becomes exceedingly difficult, from the great length of time which separates them, to be quite sure if the absolute unison is reached. If, on the other hand, we separate the notes in pitch, the beats grow more rapid until they give the firm perception of a discordant *interval* (and eventually of a concord at the distance of a Third), in place of a discordant *unison*. In a similar way points of light give a continuous line when succeeding one another beyond a certain rate per second, as when a burning stick is whirled round. The sense is unable to record the intervals of darkness before they are conquered by the succeeding points of light.

It is easily shown (by the Dove Siren: see Helmholtz, p. 247, &c.) that the number of beats in a given time is equal to the difference of the numbers of vibrations executed by the two tones in the same time; or we can show it graphically as under. Let one tone vibrate twenty times while the other vibrates eighteen times.

18

20

Then at *a*, *c*, and *e* both vibrations concur, and the tone is reinforced, giving the beat or pulse; at *b* and *d* the two series are exactly opposed, and in this case produce a brief moment of silence in pure tones, such as those of properly mounted tuning forks, or of stopped organ pipes. [See **INTERFERENCE**.] Here we have, as remarked above, a difference of two between the numbers of vibrations ($20 - 18 = 2$), and also a production of two beats, namely, at the points *c* and *e*.

It is manifest that **COMPOUND TONES** will beat by their upper partials if their prime tones are out of unison. It is also manifest that if their prime tones are faulty concords they will beat by their upper partials. For, take the case

of a Fifth, the lower note of which vibrates twice while the upper note vibrates thrice.



Then, as the illustration clearly shows, the third partial of the *c'* should coincide with the second of the *g'*, for both alike are *g''*; if then the *c'* is not a pure fifth to the *g'*, neither will the two *g''*'s make a pure unison; and they will beat, although the primes are far beyond beating distance. The same is shown by the second example to hold good of a Fourth, which if impure will beat by the fourth partial of the lower note against the third of the upper note. Here we may also note a curious point remarked by Helmholtz. The ratio of a Fifth is 3:2, and it is the third partial of the lower note which (in the case of an impure interval) beats with the second partial of the higher note. So also the ratio of a Fourth is 4:3, and it is here the fourth and third particles of the respective notes which beat. The rule holds good for every interval, arising naturally from the principles laid down by Helmholtz, to whose work on the "Sensations of Tone" the reader is referred for the detailed explanation of the phenomenon.

The untrained ear hears with ease only about 25 beats a second; a little training enables one to hear a little over 30, so that the 33 beats of the semitone *by-c''* (given in our illustration above, at the proper pitch) can be clearly distinguished after practice. (*c''* has 528 vibrations per second; *b'* has 495: their difference is therefore 33, and the number of beats, as previously shown, follows the difference of vibration numbers for the same period of time.) So also the 66 beats given by the same notes an octave higher can be heard, and also even more rapid beats than this, by training the ear gradually to their perception. Nevertheless, it always remains impossible to hear this number (66 beats) given by a wider interval *lower* in the scale. It is exceedingly difficult to hear the 59 beats per second given by *by-c''* (see last bar of illustration) for example. And although 33 beats per second can be heard with a little care at about the pitch of *c''*, the same number are indistinguishable at the pitch of *c'*, an octave lower. The audibility of beats diminishes for the number per second as we descend the scale, and increases as we increase the acuteness of the pitch.

The pianoforte generally furnishes but too many examples of this phenomenon, as irritating to the ear as flickering of light is to the eye; but if an even temperature and a well-made instrument have preserved the reader from the experience, he can easily produce it by weighting one string of the two or three forming the unison, with a small lump of wax.

BEATTIE, JAMES, was born in Scotland, at Lawrencetown, a village in the county of Kincardine, on 25th October, 1735. His parents kept a small farm. James Beattie received his first education at the village school. He entered Marischal College, Aberdeen, in 1749; obtained a bursary, or scholarship, and other honours; and after completing his course of study was appointed, 1st August, 1753, schoolmaster to the parish of Fordoun, at the foot of the Grampians. In this solitary abode his poetic temperament was fostered by the grand scenery which surrounded him, and his works evince the zeal and taste with which he studied the ever-changing beauties of nature. He attracted the favourable notice of a neighbouring proprietor, the celebrated Lord Monboddo, with whom he ever after maintained a friendly intercourse. In June, 1758, he was elected usher to the grammar-school of Aberdeen; and in 1760 he was appointed professor of moral philosophy and logic in Marischal College.

His first and chief business was to prepare a course of

lectures, the substance of which, as they were remodelled by long study and frequent revision, was given to the world in his "Elements of Moral Science." His first poetical attempts were published in London in 1760. The "Minstrel" was commenced in 1766; but during that year all his pursuits, except those which were compulsory, were interrupted by the bad state of his health. In 1767 he began to compose his "Essay on Truth," which was written avowedly to confute the moral and metaphysical doctrines advanced by Hume. This work appeared in 1770.

The first canto of the "Minstrel" was published anonymously in 1771. In 1773 he obtained a pension of £200. The king (George III.) received him with distinguished favour; and the University of Oxford conferred on him the honorary degree of D.C.L. In 1790 he suffered an irreparable loss in the death of his eldest son, a young man of great promise, at the age of twenty-two; and his declining health received another shock in 1796 in the unexpected death of his only surviving son after a week's illness, in the eighteenth year of his age. He said, in looking on the corpse, "I have now done with the world," and he never again applied to study of any sort. The closing years of his life exhibit a melancholy scene of gloom and distress, bodily and mental. He was struck by palsy in April, 1799, and after one or two subsequent attacks, expired 18th August, 1803.

Of his writings the "Minstrel" is that which now probably is most read. It exhibits a strong feeling for the beauties of nature, which will probably prevent its being entirely forgotten. Beattie's metaphysical writings have the reputation of being clear, lively, and attractive, but not profound. The "Essay on Truth" was much read and admired at the time of its publication, but has fallen into comparative neglect.

BEAUCAIRE, a town in the department of Gard in France, stands at the base of a bare rocky cliff on the right bank of the Rhone, 439 miles S.E. of Paris and 16 E. of Nîmes. The population in 1882 was 9500. The town communicates with Tarascon, on the opposite bank of the Rhone, by a magnificent suspension bridge of four arches, which spans the river at a point where its breadth is 1700 feet. It was erected in 1829 at a cost of £600,000. It is the largest in France, and ranks next to Menai. The streets of Beaucaire are narrow, but the houses are pretty well built. The most remarkable buildings are the Tour-Carrée (a square tower of admirable structure), the church, the town-hall, and the gate of the Rhone. On the rock above the town are the ruins of the old castle of Belliandro, which belonged to the counts of Toulouse.

Beaucaire is very advantageously situated for trade. It has communication with the Mediterranean by the Rhone, which is navigable for vessels of considerable size up to the town; by the canal of Beaucaire, or Aigues-Mortes, which forms part of the great system of canals that unites the Rhone and the Garonne; and by the railway through Nîmes and Montpellier to Cette. A railway also joins Beaucaire to the iron and coal districts of Alais and Grande Combe. Its favourable position long made it an entrepôt of the trade of France with Spain, Africa, Italy, and the Levant. A great fair is still held here every year during the month of July, and is one of the largest in Europe. It is said to date from the year 1168. In former times, when the fair was free from duty, it was attended by merchants from almost all parts of Europe, from the Levant, and even from Persia and Armenia; but the imposition of numerous imposts, foreign wars, the competition of Marseilles, Lyons, and other places, and the introduction of railways, has greatly reduced the numbers attending it. They are, however, still so large that for their accommodation a supplemental town, regularly laid out in streets, is built of tents in a vast meadow bordered with elm and plane trees which extends between the Rhone and the ruins of

the old castle. Here articles of every kind, whether of convenience or luxury, may be found; and in this city of canvas the main business of the fair is transacted. A tribunal consisting of twelve members settles any disputes arising between the buyers and sellers during the continuance of the fair. All bills are payable on the 27th, and the fair closes at midnight on the 28th. The ordinary commerce of the town consists of corn, flour, provision stores, wine, oak planks, &c. The principal manufactures are hosiery, serge, silk stuffs, olive-oil, pottery, and leather. There are stone quarries in the neighbourhood.

The name of the town is derived from *Bellum Quadrum* ("beautiful square"), the name by which the square base on which the castle stands was known in early times. The town occupies the site of the ancient *Ugernum*, and the Aurelian road from Nîmes to Spain passed through it. Several remains of the Roman city have been discovered.

BEAUCE, LA (or, as it is sometimes written, *Beauce*), is a district in the former province of Orléanais in France. It now forms the greater part of the departments of Eure-et-Loire and Loire-et-Cher. Chartres was its capital.

BEAUFORT, a town in the department of Maine-et-Loire, France, is situated in an extremely fertile country on the right bank of the Loire, 15 miles E. of Angers. It has a communal college, and 4700 inhabitants, who manufacture sailcloth, zinc, leather, &c. There is also a considerable trade in corn, wine, oil, fruit, hemp, &c. The town formerly had a strong castle, and it gives the title to the English Duke of Beaufort.

BEAUFORT, CARDINAL, Henry Beaufort, Bishop of Winchester and Cardinal of St. Eusebius, was a son of John of Gaunt, duke of Lancaster (father of Henry IV.), by his mistress Catherine Swynford, whom he subsequently married. He was probably born about the year 1370. He studied at Oxford, Cambridge, and Aix-la-Chapelle. In 1397 he was created bishop of Lincoln, became chancellor of the University of Oxford in 1399, and in 1404 succeeded the celebrated William of Wickham as bishop of Winchester. In the Parliaments of 1404 and 1405 he officiated as lord chancellor, an office which he filled four times during his life.

At the Council of Constance in 1417 he voted for the election of Pope Martin V., who in return made him cardinal and apostolic legate in England and Ireland. When Henry V. endeavoured to impose a tax upon the clergy in order to carry on the war in France, Beaufort strongly opposed the measure, but lent the king £28,000 out of his private purse for that purpose. His zeal for the clergy was recognized by the pope, who sent him to Germany to organize a crusade against the Hussites. This failed, and as Beaufort used the funds he had been intrusted with for this purpose in the fitting out of the English army invading France, he came under the papal displeasure.

On the death of Henry V. in 1422, Beaufort (with his brother, afterwards Duke of Exeter) was appointed guardian of his infant successor: Beaufort was also a member of the council of regency, of which the king's uncle, Humphrey, duke of Gloucester, was the nominal head. The struggle for supremacy between these ambitious men, which soon assumed the character of a fierce personal contest, is the most prominent feature of the internal history of England from the year 1421 to the year of their death, 1447. In 1429 Cardinal Beaufort succeeded in destroying the power of his rival Gloucester, by having the young king crowned, and by inducing the Parliament to declare on the occasion that the office of protector, filled by the duke, was, *ipso facto*, at an end. From being at the head of the council of regency, Gloucester was thus reduced to his rank as a peer. From this time till his death the councils of the cardinal predominated in the administration.

A powerful party however, headed by the Duke of Gloucester, opposed itself to the administration of the

cardinal. In a meeting of peers, in 1131, it was proposed that, as the dignity of cardinal was, by the law of the land, incompatible with the possession of a bishopric in England, Beaufort should be removed from the see of Winchester. Gloucester followed up this motion with a series of charges, to the effect that Beaufort had incurred the penalties of *præsumptio* in having accepted the Papal bull, contrary to the express prohibition of the late king, and he exempted himself as legate from jurisdiction of the see of Canterbury. The same charges were renewed in a more formal manner by Gloucester in 1134. He accused the cardinal also of having amassed wealth by dishonest means, of having usurped the functions of sovereignty, and of offence. That these charges were founded in truth is evident from the fact that two acts of parliament were passed, one in 1132, and other in 1137, indemnifying Beaufort against the penalties of *præsumptio*, and pardoning him for all crimes committed up to the 20th of July in the last named year. The arrest and probable murder of Gloucester are usually ascribed to his fierce and courageous denunciation of the ecclesiastical counsellors of the king. Gloucester's death took place on the 28th of February, 1147. The cardinal survived his great rival but six weeks. His great wealth was distributed, according to the provisions of his will, in charitable donations; and the Hospital of St. Cross at Winchester still exists as a monument of his munificence. Cardinal Beaufort was buried in the beautiful chantry which bears his name in Winchester Cathedral.

BEAUFORT, MARGARET, COUNTESS OF RICHMOND AND DERBY, is entitled to honorable mention as an eminent patroness of literature, after the manner of the age in which she lived. She was the daughter and heiress of John Beaufort, duke of Somerset, grandson of John of Gaunt, duke of Lancaster, and of Edward III. Margaret Beaufort was born in 1411. She was thrice married; first to Edmund Tudor, half-brother to Henry VI., created Earl of Richmond, by whom she had one son, afterwards Henry VII.; secondly, to Sir Henry Stafford, a younger branch of the ducal house of Buckingham; thirdly, to Lord Stanley, afterwards Earl of Derby. By the last two marriages she had no issue. She died in 1509, and is buried at Westminster, where her tomb may be seen in the south aisle of Henry VII.'s Chapel.

The Countess of Richmond was rich, pious, charitable, and generous. To her bounty Christ's College, Cambridge, founded in 1505, and St. John's College, Cambridge, projected and endowed by her, but not chartered till 1511, owe their existence. She also established a professorship of divinity (with a salary of 20 marks) in each university, the holders of which are called Lady Margaret's Professors; and appointed a public preacher at Cambridge (salary £10), whose duties are now confined to the delivery of one sermon yearly.

Walpole has given this noble lady a place in his "Catalogue of Royal and Noble Authors," as the translator of two books—"The Miroir of Golde to the Sinfull Soul," and the fourth book of Dr. J. Gerson's "Treatise on the Imitation and Following the Blessed Life of our Most Merciful Saviour Christ," printed at the end of Dr. William Atkinson's translation of the first three books (Pynson, 1504).

BEAUGENCY, a town in the department of Loiret in France, stands at the foot and on the slope of a hill on the right bank of the Loire, 17 miles from Orleans and 19 from Blois, on the railway which unites these two cities. The population in 1882 was 4200. The Loire is crossed by a stone bridge of thirty arches. The town was formerly defended by walls, towers, and bastions. Some of these works still remain, and preserve the feudal appearance of the town. Conspicuous above the old houses rises the square Donjon tower of the tenth or eleventh century, of very massive construction and 120 feet in height. The

town-hall is a building of the reign of Francis I., and the Church of St. Etienne is one of the most ancient in France. Brandy, cloth, and leather are manufactured, and the town gives its name to one of the best wines of the Orléannais. In the religious wars of the sixteenth century it was taken several times, and was the scene of cruel massacres. Huns, Saxons, Normans, and English have occupied it in turn; and on the 8th of December, 1870, it was captured, after an obstinate fight, by the Germans under the command of the Duke of Mecklenburg, who here took 1500 prisoners and six guns.

BEAUHARNAIS, ALEXANDRE, VICOMTE DE, a French general, was born at Martinique in 1760. He served with distinction under Rochambeau in the American War of Independence. Proceeding afterwards to Paris, he espoused the popular cause, and though elected by the nobility and gentry of Blois a member of the States general, he voted, 4th August, 1789, for the equality of all citizens and the abolition of privileges. He was appointed secretary of the National Assembly, and afterwards joined the army of the north as general. He resigned this office in 1793, in consequence of a decree of the Convention excluding noblemen from the army, and retired to his country residence at Ferte-Imbauld. From this he was brought by an order from the revolutionary tribunal, and put upon his trial for complicity in the surrender of Mainz. Being found guilty and sentenced to death, he was guillotined on 23d July, 1794, meeting his fate with calmness and courage. At an early period of his career he married Mdlle. Josephine Tascher de la Pagerie, who subsequently became the wife of Napoleon I. and empress of France.

BEAUHARNAIS, EUGÈNE, son of Vicomte Alexandre Beauharnais, was born in September, 1780, and received his early education at the College of St. Germain-en-Laye. His mother, Josephine, in 1796, married as her second husband General Napoleon Bonaparte; who treated her children, Eugène and Hortense, as if they had been his own. Eugène accompanied Bonaparte to Italy, and afterwards, in 1798, to Egypt, where he acted as his aide-de-camp, and was ever after employed and trusted by him till his fall in 1814. When Bonaparte became emperor Eugène was created a prince of the new empire, and in 1805 was appointed viceroy of the newly-created kingdom of Italy. He was adopted by Napoleon in January, 1806, and soon after married Augusta Amelia, daughter of the King of Bavaria.

In the disastrous retreat from Moscow Eugène succeeded in keeping together the remnants of his own corps, and maintaining some order and discipline among them; and after Napoleon and Murat had left the army he took the command of the whole. After his return to Italy in March, 1814, being attacked by the Austrians on one side, and by Murat at the head of the Neapolitan army on the other, he withdrew to the Mincio. On the 16th of April Eugène and Marshal Bellegarde, the Austrian commander, signed the convention of Schiarino Rizzino, by which hostilities were suspended, the French troops remaining in Italy were sent away, and Venice, Legnano, and other fortresses were delivered up to Austria. Upon this Eugène retired with his family to Bavaria.

After leaving Italy Eugène lived chiefly at Munich, at the court of his father-in-law, with the title of Prince of Leuchtenberg. He died at Munich on the 21st of February, 1824, at the age of forty-five years.

BEAUJOLAIS, a district in the former province of Lyonnais in France. It now forms the northern portion of the department of RHONE, and part of the arrondissement of Roanne in the department of LOIRE. Beaujeu was the capital.

BEAULIEU, a parish in the county of Hampshire, 6 miles N.E. of Lymington, contains a priory founded by King John, to avert, it is said, divine wrath for his cruel

treatment of the Cistercian monks. Subsequent monarchs showed much favour to the establishment, and Innocent III. granted a right of sanctuary, which was long and extensively made use of. Amongst the fugitives were the wife of Warwick the king-maker, and also Perkin Warbeck, who, however, voluntarily gave himself up under promise of his life being spared.

BEAUMARCHAIS, PIERRE AUGUSTIN CARON DE, a French poet, wit, and dramatist, was born at Paris on 24th January, 1732. His father was a watchmaker, and brought up his son to the same business, in which young Beaumarchais showed considerable skill. A new escapement which he had introduced having been pirated by a rival maker, he appealed to the Academy of Sciences and established his right to the invention. This event attracted the attention of the king, Louis XV., and gave Beaumarchais a footing in the court, which he soon turned to his advantage. Being passionately fond of music, and a very skillful player upon the harp and guitar, he attracted the attention of the daughters of the king, and was appointed their music-master. The wife of the comptroller of the royal household having conceived a strong attachment to Beaumarchais, she persuaded her husband, who was advanced in life, to resign in his favour, and on her husband's death Beaumarchais married her, and four years later obtained a title of nobility. At court he made the acquaintance of the banker Duverney, by whose assistance he was enabled to engage in several lucrative speculations and amass considerable wealth. He also turned his attention to literature, and in 1767 produced his first play, "Eugene," and in 1770 another, entitled "Les Deux Amis." Having become engaged in a lawsuit with the son of Duverney, he published his "Memoirs" in 1771, which were universally read and gave him immense popularity. In these he displayed such powers of wit, sarcasm, and logic as to arouse even the envy of Voltaire, while his trenchant exposure of the abuses that were bringing on the Revolution contributed not a little to hasten its arrival. In consequence of this he lost the favour of the court for a time, but afterwards regained it, and was employed by the king to take supplies of money to the colonies of America, then engaged in a struggle with England. He also traded largely on his own account in arms and ammunition, and made very large sums by his transactions. In 1775 he brought out "Le Barbier de Seville," and in 1781 "Le Mariage de Figaro." These world-famed comedies, although they manifestly favoured the rising flame of revolutionary ideas, were very successful at the time of their production, and to this day afford never-ceasing delight. It is upon these that Beaumarchais' fame chiefly rests. Both comedies have been made to serve as libretti for operas; the second, as the "Nozze di Figaro," is a masterpiece by Mozart, the first gains a new immortality through Rossini. His closing years were darkened by pecuniary difficulties, and he was compelled to take refuge in England and Holland, having come under the suspicion of the republican leaders. He died rather suddenly 17th May, 1799. His works were published in 1802, and again in 1827. An interesting life of Beaumarchais was published by M. de Lomenie in 1856, which has been translated into English by H. S. Edwards (four vols. 1865).

BEAUMARIS (French, "Fair Marsh"), a parish, borough, port, and the county town of Anglesey, North Wales. It is situated on the Bay of Beaumaris, at the northern entrance of the Menai Strait, and is $4\frac{1}{2}$ miles from the Menai Bridge, $3\frac{1}{2}$ miles from Bangor, and 239 miles N.W. from London. The castle of Beaumaris was probably the origin of the town. After Edward I. had secured his conquests in Carnarvonshire by the erection of the castles of Carnarvon and Conway, he built that of Beaumaris in 1295. A low spot was selected for the site, in order to have a large fosse around the castle filled with water from

the sea. A canal was also cut to enable small vessels to discharge their lading under the walls for the use of the garrison. The ruins of the castle consist of an outer baillium flanked with ten circular bastion towers, and with an advanced work, called the Gunner's Walk, on the south side. About the centre of this fortified inclosure stands the principal building or keep. It is nearly quadrangular, with a large round tower at each angle, and another in the centre of each face. The principal entrance faces the sea, and is formed by two circular bastion towers. In the Civil War the castle was held for a time by the Royalists against the Parliament, and in 1616 it was surrendered on terms of honourable capitulation to General Mytton. When Edward I. built the town he surrounded it with walls, made it a corporation, and gave it great privileges and some valuable lands. Llangoth, Amlwch, and Holyhead, with Beaumaris, formerly sent a member to Parliament, but they were deprived of separate representation in 1885.

Beaumaris commands lovely marine views, and is a favourite resort of visitors for sea-bathing. There is communication by steam with Liverpool during the summer. The bay before the town affords good anchorage for ships, having 7 fathoms water at the lowest ebb. Vessels often find security there in hard gales. The town of Beaumaris consists of several streets, of which one, terminated by the castle, is well built and the houses neat. There is an Episcopal chapel containing some fine monuments, town-hall, county-hall, and custom-house. The exports are chiefly copper and other ores, slates, and marble. Under the Municipal Corporations Reform Act the borough is governed by a mayor, four aldermen, and twelve councillors. The population of the parliamentary borough in 1881 was 2241; of the parish, 190. The number of vessels registered as belonging to the port in 1883 was 190 (11,300 tons). The entries and clearances each average about 5000 (1,100,000 tons) per annum.

BEAUMONT, FRANCIS, and JOHN FLETCHER, poets and dramatists. We follow the example of former biographers in relating what is known of the lives of these distinguished men, who were so closely associated in their friendship as well as literary labours, in one article.

FRANCIS BEAUMONT, the eldest son of Francis Beaumont, one of the judges of the Court of Common Pleas, and of Anne, daughter of George Pierrepont, of Holme-Pierrepont, in the county of Nottingham. He was born at the family seat at Grace Dieu, in Leicestershire, in 1586. At ten years of age (for people went earlier to the university in those days) Beaumont was admitted a gentleman commoner of Broadgate's Hall (now Pembroke College), Oxford. He afterwards became a student in the Temple, London; married Ursula, daughter and co-heir of Henry Isley, of Smbridge, in Kent, by whom he had two daughters; died before he was thirty, in the spring of the year 1615, and was buried at the entrance of St. Benedict's Chapel, in Westminster Abbey, without any inscription. As Beaumont's life was so short, and his writings apparently so numerous, it is natural to suppose that he paid little attention to the law. He records, in a poetical epistle, his intimacy with Ben Jonson and the other men of literary pursuits who assembled at the Mermaid Tavern.

JOHN FLETCHER was born December, 1579, at Rye in Sussex, of which place his father was incumbent. The latter subsequently became queen's chaplain, dean of Peterborough, bishop of Bristol in 1589, of Worcester in 1593, and of London in 1594. He died 15th June, 1596, in distressed circumstances, leaving eight children. John Fletcher entered Bennet College, Cambridge, 15th October, 1591. He was resident at Cambridge in 1593, but how long he remained and whether he took any degree is uncertain. His earliest known play was produced in 1606-7, and he continued writing until the close of his life in 1625, when he fell a victim to the plague.

The theatre was most probably the means of bringing these two friends into acquaintance with each other, and their future works, consisting of fifty-two plays, in addition to a masque and some minor poems, were published in their joint names, which must for ever remain inseparably connected. According to Aubrey, their friendship was singularly close, so that while they lived together they had bed, board, and apparel in common, which state of things continued until the marriage of Beaumont. A natural curiosity has existed to know what were the distinguishing characteristics of the portions furnished to their common writings by these illustrious friends. It has generally been believed that Fletcher contributed the vivacity and Beaumont the judgment. "I have heard," says Aubrey, "Dr. John Earle (since Bishop of Sarum) say, who knew them, that his (Beaumont's) main business was to correct the overflowings of Mr. Fletcher's wit." Yet Earle, in his verses upon Beaumont, expressly attributes to him whole plays in which his genius is quite as exuberant as Fletcher's. The reason which Aubrey gave for their strong personal attachment may apply with equal force to this question. "There was a wonderful consistency of phantasy," he says, "between him (Beaumont) and Mr. John Fletcher, which caused the dearness of friendship between them." The "wonderful consistency of phantasy" was seen in their friendship as well as in their plays. They loved one another fully and entirely, and exhibited the only great spectacle existing of two men writing on, and puzzling posterity to know which was which, precisely because their faculties were identical. Beaumont and Fletcher are the dramatists of all others whom a liberal modern reader could the best endure to see in an expurgated edition. The purest characters in their plays are not free from an admixture of things which they ought not to talk about; while elasticity is overwrought, and put to absurd trials, as it there could be no faith in it but from the most extravagant proof. In short, a something not entirely true to nature pervades all their writings, running side by side with the freshest and loveliest passages; and while one half of a scene or sometimes of a speech, or even a couple of sentences, gushes out from the author's heart, the other is brought from some fantastic fountain of court manners and talk, and produced for the sake of effect upon the town.

BEAUNE, an old Burgundian town in the department of Côte-d'Or, in France, is built at the foot of a hill, on the little river Bonzeise, 23 miles S. of Dijon, and had 11,000 inhabitants in 1882. The town is well built, the streets are straight, and kept clean and cool by running streams and fountains. It was formerly fortified, and had several gates. The ramparts still remain; they are planted with trees, and form an agreeable promenade. Broadcloth, serge, druggets, and large numbers of wine casks are made. The Church of Notre Dame, founded by Duke Henri of Burgundy in 976, is considered the finest in the department after the Cathedral of Dijon. The Church of St. Pierre was completed in 1498; in its erection the materials of an old heathen temple were used, and representations of pagan sacrifices, and inscriptions in Roman character, are still seen on the pillars of the church. The hospital, founded and endowed by chancellor Rollin in 1443, is a beautiful Gothic building. The other remarkable objects in the town are the theatre, the public baths, the public library, in which there are 30,000 volumes, a beautiful fountain called L'Aigue, and a large public garden. Beaune is the seat of a tribunal of first instance and of commerce. The town is supposed to derive its name from the Latin *Bellona*, and to have had a Roman origin. It was certainly fortified as early as the seventh century. It was formerly the residence of several of the dukes of Burgundy, and the first session of the parliament of Burgundy was held in it. The environs of Beaune produce Burgundy wines of the first class, and contain several stalactitic grottoes. There is a cascade

80 feet high at Nolay, the birthplace of Carnot, at a short distance from Beaune.

BEAUNE LA ROLLANDE, BATTLE OF, a sanguinary and closely contested engagement fought on the 28th November, 1870, between the French newly-raised army of the Loire, under General d'Aureilles de Paladine, and the left wing (under General Voigts Retz) of the extended German army covering the south of Paris. The attack was commenced by De Paladine, who hoped thus to force his way to Fontainebleau, and from thence advance to the rescue of Paris. His troops, few of whom had till now ever been under fire, fought with heroic courage, and more than once attempted to storm the German position, but were repulsed with fearful loss. Successive onslaughts, however, were so weakening the German forces that the ultimate issue of the battle would have been very doubtful but for the timely arrival of Prince Frederick Charles with large reinforcements. This completely turned the day, and the French were compelled to retire with heavy loss. The Germans also evacuated the town during the night, but only to prepare for that simultaneous advance along their whole line which entirely shattered the great army gathered on the Loire.

BEAUVAIS, an ancient episcopal city of Picardy, now the capital of the department of Oise, in France, is 45 miles N. from Paris, and had 15,000 inhabitants in 1882. It is situated in a fertile valley surrounded by wooded hills, on two little rivers, the Avelon and the Therain, which meet in the town, and throw their united waters into the Oise a little S. of Creil. The streets of Beauvais are straight not regular, but great improvements have been made of late years. Some of the houses are, however, still built of wood, and many of them have the exteriors decorated with emulous carvings and sculptures. Beauvais was formerly surrounded with ramparts and ditches; these have disappeared, and given place to beautiful promenades planted with trees. In the interior of the town is a part called "la cite," which bears marks of great antiquity; it is of a square form, begirt with massive walls 7 feet thick, and flanked with round towers. These walls are said to date from Roman times. The suburb Le Thil or St. Lucien contained the abbey of St. Lucien, founded by Childebert in the fifth century. The abbey church, situated on a hill covered with vines, contained statues of all the kings and queens of the Merovingian dynasty, and a large number of other curious and precious objects, all of which were dispersed or destroyed at the Revolution. Beauvais contains several fine public buildings. The Cathedral of St. Pierre is greatly admired for its façade, its vast size, great elevation, and delicacy of structure. The choir is 53 feet wide between the walls, 117 feet long, and 153 feet high, being the loftiest in the world. The interior is lighted by windows of the best period of glass-painting, and decorated with beautiful silk tapestry, representing scriptural subjects. Contiguous to the cathedral is a basilica of the sixth century—one of the oldest buildings of the kind in France. The Church of St. Etienne is famous among archaeologists for its sculptures and its magnificent windows, and is considered a fine specimen of the Renaissance style. The town-house forms one side of a large square; it is an elegant modern structure, and presents by its regularity a striking contrast to the houses near it. The episcopal palace (now the palace of justice) was rebuilt in the fifteenth century, and resembles, with its gilding walls and towers, a little fortress. The college, established in the former Ursuline convent, is a large and commodious building. Beauvais also contains a public library, theatre, court-house, large cavalry barracks, and two well-endowed hospitals. One of the hospitals receives orphans and foundlings, who are instructed in all the processes of the manufacture of broadcloth, from the washing of the wool to the dressing of the cloth; the profits arising from the work are added

to the funds of the institution. The town also possesses a chamber of arts and manufactures, and tribunals of first instance of commerce.

The manufactures of Beauvais are important. For silk tapestries it has been long famous—a government manufactory having existed there since 1664. Broadcloths of every quality and colour, flannels, especially a kind called *molleton*, swansdowns, shawls, hosiery, cotton and woollen yarns, ribbons, black lace, china, and chemical products, are also extensively manufactured. There are establishments for bleaching linen, tanneries, and dye-houses. The commerce of the town consists of its industrial products and corn.

Beauvais was called *Cesaromagus* by the Romans till the time of Constantine the Great, when, from the Celtic tribe whose capital it was, it took the name of *Belloraci*, to which the modern name is clearly traceable. It fell under the power of Chilperic in 471, and in succeeding times was often taken, pillaged, and burned by the Normans. In 1232 the citizens framed a charter for themselves, to which they forced their bishop to swear obedience. In the rising of the peasantry in 1357 Beauvais took part against the nobles, and the neighbourhood was the scene of a great slaughter of the peasants. The English made a fierce but unsuccessful assault upon the city on the 7th of June, 1433. In 1472 it was besieged by Charles the Bold, duke of Burgundy, with an army of 80,000 men. Being destitute of a garrison the city might have fallen by a *coup de main* had not the citizens boldly closed their gates, and maintained an obstinate resistance until help arrived from Paris. During this siege the women of Beauvais distinguished themselves by their courage, and one of them, named Jeanne Laine, battle-axe in hand, tore down and bore off in triumph a standard which had just been planted on the walls by the Burgundians. This courageous act procured for the heroine the name of Jeanne la Hachette, and has been celebrated every year since, except for a short time after the Revolution, by a procession in which the banner is carried by young girls, and the women take precedence of the men. The procession takes place on the Sunday nearest the 14th of October (the feast of St. Anne). The banner is carefully preserved in the town-hall. A statue of the heroine stands in the great square. From its impregnability Beauvais obtained the name of *La Pucelle*. It was, however, surprised and captured by the Prussians on 30th September, 1870.

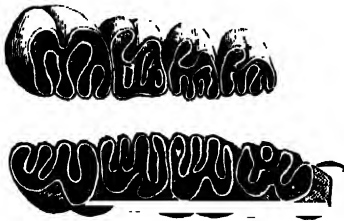
BEAUVOISIS, LE, a district in the former province of Picardy, which now forms the greater part of the arrondissement of Beauvais in the department of Oise.

BEAVER is the English name for the genus *Castor*, belonging to the order *RODENTIA*. There are two incisors, or cutting teeth, and eight molars in each jaw—twenty in

horizontally flattened, nearly oval, and covered with scales; it is of great assistance in diving and aquatic movements, the popular idea that the beaver uses it as a trowel to plaster its house being erroneous. There are five toes on each of the feet, and those of the hinder ones are webbed, the webs extending beyond the roots of the nails. The second toe of these last is furnished with two nails, one like those of the other toes, and another beneath it situated obliquely with a sharp edge directed downwards. There is also a less perfect double nail on the inner toe of the hind feet. The beaver (*Castor fiber*) is a native of the northern regions of America, and in Asia it is found on the rivers of Siberia. In Europe it occurs sparingly along the banks of the Rhone, the Elbe, the Weser, and the Danube. It also occurs in Russia and Poland, and it has only lately become extinct in the Scandinavian peninsula. Some naturalists regard the American beaver as distinct from that of Europe and Asia, but the difference observable either in external or anatomical characters is very inconsiderable, and the opinion that a great difference exists in instincts and habits appears to have been too hastily adopted. In Siberia the beaver is taken not for the sake of its fur, but for its musk (*castoreum*), which yields a very high price.

Formerly the beavers were inhabitants of our island, and Giraldus Cambrensis gives us a short account of their habits in Wales; but even in his time (1188) they were found only on the river Teify. Pennant says: "Two or three waters in that principality still bear the name of *Llyn yr Afan*, or, 'the Beaver's Lake.' . . . I have seen two or three supposed haunts; one in the stream that runs through Nant Ffionon, the other in the river Conwy, a few miles above Llanrwst; and both these places in all probability had been formerly crossed by beaver-dams. But we imagine they must have been very scarce, even in earlier times. By the laws of Howeldda the price of a beaver's skin (*croen lloethlydan*, broad-tailed animal) was fixed at 120 pence, a great sum in those days." Frank Buckland, in his "Curiosities of Natural History," says—"Beavers have not long been extinct in England. I have a fine specimen of a beaver's jaw, not fossil, dug up in the fens of Lincolnshire; and I have heard on good authority that beavers were killed in Wales in the time of Oliver Cromwell."

The American beaver (*Castor fiber*, var. *canadensis*) is still abundant in North America, particularly in Canada.



Molar Teeth of the Beaver.



American Beaver (*Castor fiber*, var. *canadensis*).

This beaver displays in great perfection the combination of remarkable instincts with a high degree of intelligence. Its habits have been well described by many excellent observers, amongst whom may be mentioned Hearne, Sir J. Richardson, Agassiz, and Morgan.

The American beaver is aquatic in its habits, generally taking up its abode in lodges in the neighbourhood of streams. Each lodge usually contains from four to eight beavers, and the number never exceeds twelve. Several of these lodges being built close together, a society or colony is formed. Solitary beavers, always males, are often found living in burrows on the streams by the trappers, who call them "idlers." The lodges are probably merely modified

all. The incisor teeth of the beaver are broad, flattened, and protected anteriorly by a layer of orange-coloured enamel, the rest of the tooth being of a comparatively soft substance, whereby a cutting chisel-like edge is obtained. The molar teeth have flattened crowns, their inner border in the upper jaw being marked by a single enamelled fold, and their outer by three folds, the arrangement being reversed in the lower jaw. The tail of the beaver is broad,

burrows, and in reference to this Morgan says—"The lodge is but a burrow above ground, covered with an artificial roof, and possesses some advantages over the latter as a place for rearing young. There are reasons for believing that the burrow is the normal residence of the beavers, and that the lodge grew out of it, in the progress of their experience, by a process of natural selection. In addition to the lodge, the same beavers who inhabit it have burrows in the banks surrounding the ponds." And again the same writer says—"A burrow accidentally broken through at its upper end, and repaired with a covering of sticks and earth, would lead to a lodge above ground, and thus inaugurate a beaver lodge out of a broken burrow." In Europe the beaver rarely constructs lodges, but lives in burrows; and this is also the case in some parts of North America.

Three different kinds of lodges are constructed by the beavers—bank, island, and lake lodges. The bank lodges, according to Morgan, are of two kinds: "One is situated upon the bank of the stream or pond, a few feet back from its edge, and entered by an underground passage from the bank of the stream, excavated through the natural earth up into the chamber. The other is situated upon the edge of the bank, a portion of it projecting over and resting upon the bed of the channel, so as to have the floor of the chamber resting upon the bank as upon solid ground, while the external wall on the pond side projects beyond it, and is built up from the bottom of the pond." The island lodges are made of sticks and mud, and are artificial ponds.

caused by the dams thrown across the stream by the beaver. There are usually two entrances into the lodge. One, which is straight, and rises gradually from the bottom of the pond, the beavers construct to serve as a road by which to bring their wood-cuttings into the lodge. The other is steep and winding, and is used as the ordinary entrance and exit for the animals themselves. The entrances are arched with a roof of sticks and mud, and lead directly into the lodge, upon the floor of which is constructed a circular or oval chamber, formed of sticks plastered with mud. The lake lodges, being built on hard and shelving shores, project greatly over the water. When building the beavers are always careful to choose a spot which is well protected, and where the water is sufficiently deep to prevent their habitations from becoming frost-bound.

The food of the beavers consists largely of the roots of a water lily (*Nuphar*). They also feed on the bark of poplars, willows, birches, and other trees. The beavers fell the trees by gnawing with their sharp incisor teeth round the base of the trunk, and widening the groove as they cut deeper. It is interesting to notice that they cause the tree to fall in the direction of the water by gnawing chiefly on the side of the trunk that is remote from it. By so doing the labour of transport is considerably lightened. The tree once felled they set to work cutting off the branches, which they then divide into suitable lengths of 5 or 6 feet. Next they have to transport these cuttings to their lodges, and this they effect in a very ingenious way. "They shove and roll them with their hips, using also their legs and tails as levers, moving sideways in the net. In this way they move the larger pieces from the more or less elevated ground on which the deciduous trees are found, over the uneven but generally descending surface to the pond. After one of these cuttings has been transported to the water, a beaver, placing one end of it under his throat, pushes it before him to the place where it is to be sunk." When sunk the beaver sticks these cuttings through brushwood which is firmly fixed in the mud at the bottom of the pond. In this way they prevent their supplies from being carried off by currents.

The best illustration of the marvellous intelligence of the beavers is afforded by a consideration of the dams they construct, an excellent account of which is given by Romanes in "Animal Intelligence." "The object of the

dam," he says, "is that of forming an artificial pond, the use of which is to afford refuge to the animals, as well as water connection with their lodges. Therefore the level of the pond must in all cases be higher than that of the lodge and burrow entrances, and it is usually maintained 2 or 3 feet above them. In external appearance there are two distinct kinds of dams, although all are constructed on the same principle. One, the more common, is the 'stick dam,' which is composed of interlaced stick and pole work upon the lower face, with an embankment of earth mixed with the same materials on the upper face. The other is the 'solid-bank dam,' which differs from the former in having more brush and mud worked into its construction, especially upon its surfaces; the result being that the whole formation looks like a solid bank of earth. In the first kind of dam the surplus water percolates through the structure along its entire length; but in the second kind the discharge takes place through a single furrow in the crest, which, remarkable though the fact unquestionably is, the beavers intentionally form for this purpose. In the construction of the dam, stones are used here and there to give down-weight and solidity. These stones weigh from 1 to 6 pounds, and are carried by the beavers in the same way as they carry their mud, namely, by walking on their hind legs while holding their burden against the chest with their fore paws. The solid dams are much finer in their consistence than the stick dams; for while a horse might walk across the former, the weight of a man would be too great to be sustained by the latter. Each kind of dam is adapted to the locality in which it is built, the difference between the two kinds being due to the following cause. As a stream gains water and force in its descent, it develops banks, and also a broader and deeper channel. These banks assume a vertical form in the level areas where the soil is alluvial. Thus, an open stick work dam could not in such places be led off from either bank; and even if it could, the force and depth of the stream would carry it away. Therefore in such places the beavers build their solid-bank dams, while in shallow and comparatively sluggish waters they content themselves with the smaller amount of labour involved in the building of a stick dam." These dams attain enormous lengths, one described by Agassiz reaching as much as 650 feet.

Sometimes, however, it happens that the distance between the lodge and the supply of wood is considerable, and the ground is too uneven to enable the beavers to bring home their cuttings without great difficulty. The beavers then cut trenches or canals, and make a clear unobstructed passage between their supplies and the lodge. These canals, which Morgan was the first to describe, are made with perpendicular sides, and are usually 3 feet deep and from 3 to 5 feet wide. Morgan gives instances of beavers, in cases where a river makes a considerable bend, carrying a canal across the narrowest part to save the labour that would be expended in going round the curve of the river.

It is not only for its fur that the beaver is prized, but for a product called *castoreum*, found in certain glandular sacs situated near the organs of reproduction, and used in medicine and perfumery. This substance is produced also by the beaver of Europe, and was well known to the ancients, by whom it was held in high repute as a remedy for hysteria and similar diseases.

The beaver, when taken young, is easily domesticated, and becomes very docile and familiar. The fur of the beaver varies from glossy brown to almost black; the tail, or caudal paddle, used as a rudder in diving or ascending, is flat, scaled, and oar-like. On land the gait of the beaver is awkward and shuffling, owing in part to the outward turn of the hind limbs, which fits them for aquatic progression, and in part to the clumsy configuration of the body. The length of the head and body is about 40 inches, of the tail about 12 inches.

The beaver does not attain its full growth until three years of age, but it breeds before that time. The female is provided with eight teats, and usually produces, about the middle or towards the end of May, a litter of from four to eight or even nine young. White and spotted varieties of the beaver are sometimes to be met with.

(“The American Beaver and his Works,” by Lewis H. Morgan, New York.)

Fossil Beavers.—Fossil remains of a beaver, identical with the European species, have been discovered in the Miocene and Pliocene deposits of Europe, independently of a larger species, the *Castor trogontherium*, which existed in post-Pliocene times, but became extinct before the historic period.

BECCAFICO is a species of bird of the family Sylviidae (WAHLBERG), in the order PASSERUS. The term Beccafico, or fig-eater, is applied on the Continent to different kinds of silvan warblers, when they are fat and in condition for the table; and they are generally fruit-eaters in the fruit season; but the true beccafico, with its exquisite flesh, is the greater pottelchaps or garden warbler (*Sylvia hortensis*). This bird, which, in many districts of England, and even of Scotland, is far from being rare, was first described as a British species by Latham. It arrives in April, and departs early in September, and everywhere prefers dense orchards, copses, and extensive gardens of fruit trees. It is abundant over the south of Europe. The song of this species is very pleasing, and sometimes uttered after sunset; the strain is varied, and some persons deem it little inferior to that of the nightingale. In its habits this bird is shy and reclusive, lurking in the thickest foliage. Its flight is peculiarly graceful, and it darts on insects with the most consummate address; but, unlike the fly-catcher, it seldom returns to the same perch. It builds its nest in



Beccafico (*Sylvia hortensis*).

thick hedgerows or bushes near the ground; often in the neighbourhood of gardens, which it frequents, like the blackcap, for the sake of currants and other fruit. The eggs are white, blotched with wood brown; they are usually five in number.

In length this pretty warbler measures about 6 inches. The whole of the upper parts are oil green, with a shade of ash gray; the breast and flanks are yellowish gray, inclining to wood brown; the throat and under parts grayish white; the orbits of the eyes white; the irides brown; the bill wood brown; the legs and claws bluish gray. The female is similar in plumage to the male. The young birds of the year have the plumage of a duller tint.

Another species (*Sylvia cristicola*) is known also by the name Becamoschino. This little bird, like the TAYLOR-BIRD, constructs a nest by sewing together leaves with vegetable fibres.

BEECLES, a market-town and municipal borough in Suffolk, 32 miles N.E. by N. of Ipswich, and 109 miles from London by the Great Eastern Railway, is situated on the east bank of the river Waveney, which is navigable

for barges from Yarmouth, past Beccles, to Bungay. The town, called by the old monks *Beata Ecclesia*, is well built, consisting of several streets, with a spacious market-place. Malting is carried on to a very large extent, and the place is renowned for its ale. Its grand old parish church, dedicated to St. Michael, is a fine Gothic structure, erected in 1369, but with a massive tower and porch of later date. The whole was repaired and enlarged in 1859. Beccles also contains a town-hall, assembly room, corn exchange, and grammar-school, which has exhibitions to Emmanuel College, Cambridge. The trade is chiefly in corn. Messrs. Clowes have some large book-printing works in the town. The scenery in the neighbourhood is pleasant and pastoral. “All around spreads a level green landscape, checkered in places with light brown and yellow; striped with long rows of poplars and Dutch like avenues, and the Waveney curving hither and thither, until its bright gleam disappears under a distant range of low hills.” The population in 1881 was 5721.

BÊCHE-DE-MER, TREPANG, or SEA-SLUG, an article of food in great request among the Chinese. It consists of the dried bodies of several species of echinoderms generally belonging to the genus *Holothuria*, which abound on the coral reefs on the S.E. coasts of Asia, New Guinea, and of the Pacific. These creatures, which vary in length from 7 to 21 inches, have bodies shaped like a cucumber, and are sometimes called sea-cucumbers. They are generally obtained by divers, and when caught are cured by boiling, splitting, and then by being spread over a fire to dry. There are ten varieties sold in the Chinese market, and they vary in price from £30 to upwards of £100 per ton, according to quality. The finest are esteemed a very great delicacy by the wealthy Chinese. They are used, like the edible birds’ nests, in making a rich gelatinous soup.

BECHUANA or BETJUA NA, a nation in the interior of South Africa, lying between 22° and 28° S. lat., and 22° and 29° E. lon., with a population estimated at about 200,000. They are divided into numerous tribes, which were formerly in constant strife with each other; but they are now generally peaceable, and engaged in agriculture. One of their superstitions is a belief in “rain-doctors.” They believe also in witchcraft and charms. The houses in the towns of Bechmana are built in clusters, irregularly grouped, each cluster being under the authority of an elder or chief, subordinate to the king. The houses are circular and divided into several apartments; the partition walls are made of sticks, neatly plastered over with a composition of sandy clay, the fresh manure of cattle-pounds, and grass cut into small pieces. The roof, which is conical, is made of straw or reeds, and it projects over on every side, the eaves being supported at the height of 4 or 5 feet from the ground by posts made of the rough stems of trees, leaving between them and the outer wall of the house a sort of verandah. In the larger houses the roof covers a space of ground of about 26 feet in diameter. The house is situated in the middle of a much larger area or court, inclosed all round by a strong circular fence, which is made of straight twigs and small branches carefully interwoven. One doorway only, wide enough for a single person, leads into the court, and is closed at night by a rude wicker door. The Bechmana wear a covering round the middle, and occasionally cloaks made of skins neatly sewn together. The women wear several aprons, one above the other, bracelets of copper, and beads. They work copper and iron, and make spades, awls, bodkins, knives, spears, &c. Each tribe of the Bechmana is under the rule of an hereditary king or chief, but his authority over the subordinate chiefs is rather loose. In cases of emergency they convene an assembly of all the warriors, when speeches are delivered in succession by the chiefs. Since the introduction of Christianity among them the character of the Bechmana has greatly improved, and they

go in great numbers to Cape Colony and other parts, where they can obtain labour and wages, being much prized as servants. Full and most interesting details of the Bechuanaland occur in Dr. Moffat's "Narrative of Missionary Enterprise in Southern Africa," and in Dr. Livingstone's "Travels."

BECKER is the name by which *Pagellus erythrinus*, a member of the family Sparidae (BREAM), is generally known on the south coast of England. It is also common in the Mediterranean.

BECKER, NICOLAUS, a German poet, was born at Geilenkirchen, near Aachen, 15th January, 1810. Living in obscurity as private secretary to an advocate in his native town, he obtained in 1840 a sudden celebrity by his famous "Rheinlied," in which he happily expressed the general feeling of the German people in answer to the warlike preparations of France.

"Sie sollen ihn nicht haben
Den freien deutschen Rhein," &c.

It was sung in the streets of nearly every town in the country by huge crowds of people, and the Kings of Prussia and Bavaria liberally patronized the young poet. In France a bitter and cruel reply was written by Alfred de Musset, beginning "Nous l'avons eu, votre Rhin Allemand." Becker's other writings display very little poetic talent. He died 28th August, 1815.

BECKET, THOMAS A', was born of English parents in 1117 in London, where his father, Gilbert, was a merchant. He was first educated at Meiton Abbey, in Surrey, and afterwards at London, Oxford, and Paris. When employed in the office of the sheriff of London his manners and talents recommended him to Theobald, archbishop of Canterbury, an acquaintance of his father, by whom he was sent to study civil law, first under Gratian at Bologna, and then at Auxerre in Burgundy. On his return his patron gave him the livings of St. Mary-le-Strand, London, and Otford in Kent, and sent him to manage the business of the see of Canterbury at the court of Rome. His success recommended him powerfully both to the archbishop and to King Henry II., who made him his intimate and familiar associate, and created him chancellor in 1158—A'Becket being the first Englishman after the Conquest who was appointed to any high office—and subsequently, in 1162, after some opposition, archbishop of Canterbury. Henry wished to subject the clergy to the authority of the civil courts for murder, felony, and similar crimes, and no doubt thought that A'Becket would be his ready helper in so just and patriotic an effort, for, as a contemporary chronicler says, "the world had never seen two friends so thoroughly of one mind as the king and him" (Roger de Pontigny). But A'Becket, favourite as he was—loaded with every possible honour and possession by his friend—warned him that as primate he "would have to choose between the favour of God and that of the king," and the greatest opposition to his appointment came from himself. The struggle was as clear to A'Becket as it soon became to Henry. The powerful Pope Gregory VII. (elected 1073), a monk who realized the visions of the cloister, had shaken off the yoke so long borne, and freed the Papacy from its subservience to imperial authority. But Gregory had even gone further, and claimed authority over the secular princes. Henry, awake to the life and death struggle for supremacy, endeavoured in 1164 to get the consent of the archbishop to the celebrate "Constitutions of Clarendon," which were drawn up to bring back the clergy under the jurisdiction of the realm, as it existed in the time of "my grandfather, Henry I." [See CLARENDON, CONSTITUTIONS OF.] This at first A'Becket refused to give, with passionate denial, but was at length forced to comply. When asked to sign as well as swear, he revoked his oath, and obtained absolution for this from the pope; then, finding himself

the object of the king's displeasure, he attempted to escape to France, upon which Henry summoned a parliament at Northampton in 1165, and charged him with breaking his allegiance. He was fined heavily, and a demand for his accounts as chancellor was made; for he had resigned the chancellorship almost at once after becoming archbishop, in order the more completely to devote his services to the work of the church—at the same time abruptly changing his habits of life from those of a luxurious courtier to those of a monkish ascetic. After openly defying the king and the council in a violent scene he escaped to France, where he continued to maintain with great vigour his own rights and those which he alone, not supported even by the pope, asserted to belong to the church. From his retreats at Clairvaux and elsewhere he cursed his opponents and excommunicated them, till even Pope Alexander III. interfered, and at one time suspended him, while at another he privately absolved Henry from any spiritual injury the furious archbishop might inflict upon him. At length a reconciliation was effected in 1170, at Fréteville on the borders of Touraine, and the king restored A'Becket to his see with all its privileges. But he was rash enough immediately to publish the suspension of the Archbishop of York and the excommunication of all the bishops who had taken part in the coronation of Henry's eldest son. (This prince was also called Henry, and afterwards died before his father and co-sovereign.) A'Becket had traded on the king's ill health, and the necessity the king was under of crowning young Henry, to make clear the succession—an act which he as primate alone could perform. Regardless of the pope's express orders to his fellow-archbishop to do what he himself refused to do (unless under conditions impossible for the king to yield), A'Becket sent secret messengers before himself bearing his decrees, and England was at once aflame. The king, who was then in Normandy, is said to have expressed his vexation that none of his followers had revenged him on this insolent priest. Reginald Fitzurse, William de Tracy, Hugh de Moreville, and Richard Brito, four barons, accordingly formed a resolution either to effect the submission or the death of the archbishop. On the 29th of December, 1170, they attacked him in the Cathedral of Canterbury, out of which they tried to drag him, but he clung to a pillar near the high altar, grappled with De Tracy, and almost threw him down. Fitzurse aimed a blow at him which slightly wounded him, but broke the arm of Edward Grim, his cross-bearer. The archbishop then putting himself in a devout posture, the blows of the other assassins clove his skull and scattered his brains over the pavement.

At that time the church was a great living force in the heart of the people. A miraculous fountain broke out in the crypt, and "St. Thomas' water" was found to heal all diseases of the simple folk of those days, bringing in immense revenues and fame to Canterbury, and speedily raising the abbey to considerable splendour. Two years afterwards A'Becket was canonized, and became the most popular of English saints. Many miracles were wrought at his tomb. Under threat of excommunication, and the stigma of suspicion of having personally ordered the murder of the saint, and, above all, tortured by his conscience—which represented to him that the rebellious demand of young Henry (supported by his mother and his brothers), that the old king should give up to him either one realm or the other, either Normandy or England, was a divine judgment on him for the hasty observation which had caused the murder of the archbishop—Henry II. was forced to purge himself by oath and penance; and in 1174 he walked 3 miles along the flinty road barefoot to A'Becket's tomb, and there he, perhaps the haughtiest man in Europe, allowed the monks to scourge him in the cathedral. Nevertheless, the dark years of the close of his reign, the continued rebellion of his wife and of his sons, the gloom

and despair which settled on him till he cursed God as he retreated from a defeat at La Mans, crying, "Since Thou hast taken from me the town which I love best, I will rob Thee of that thing (the soul) Thou lovest most in me," were pointed at by the churchmen as divine judgments for his sin. Yet, cruel, lustful, ambitious, and rapacious as Henry was, he would probably have run his career unreproved by the censure of the church had he not ventured to attempt to judge a criminal priest as freely as a criminal layman. In 1221 A'Becket's body was taken up in presence of Henry III., and deposited in a rich shrine on the east side of the church. It became the resort of pilgrims, such as Chaucer has made ever famous, but the shrine was despoiled at the reformation of Henry VIII.

A'Becket's letters were published under the following title:—"Epistolæ et Vita Divi Thomæ Martiris et Archiepiscopi Cantuariensis," &c. (Brussels, 1604). In 1859 an interesting biography of A'Becket, though rather hostile in tone, was published by the Rev. J. C. Robertson, canon of Canterbury, by direction of the Master of the Rolls. See also "Life and Times of Thomas A'Becket," by Dr. Giles (London, 1845). Contemporary narratives exist, the best of which is A'Becket's chaplain, Fitzstephen. John of Salisbury is valuable; and Grim, as well as these two, has left an account of his witness of the murder.

BECKFORD, WILLIAM, was the only legitimate child of Alderman Beckford of London, who died in 1770. The bulk of the property, which consisted chiefly of large estates in Jamaica, and also of the estate of Fonthill, near Hindon, in Wiltshire, was inherited by the son, then a boy about nine years old, who is said to have thus come into an income exceeding £100,000. He had already, before his father's death, attracted notice among the alderman's distinguished friends and visitors by his liveliness and intellectual precocity; and the promise thus given was fulfilled by a little work which he published in 1780, entitled "Biographical Memoirs of Extraordinary Painters." In 1783 he married Lady Margaret Gordon, daughter of Charles, fourth earl of Aboyne. In 1784 he published his remarkable Arabian tale of "Vathek," in French. An English translation of the work afterwards appeared, the author of which Beckford said he never knew; he thought it tolerably well done. In 1794 he fixed himself in Portugal, where he purchased an estate near Entra, and built a sumptuous mansion.

On his return to England he occupied himself with the embellishment of his house at Fonthill; but in 1801-2 all the splendid furniture and pictures were sold by auction. These proceedings, however, were only preliminary to the commencement of a much more magnificent collection of products of art or ingenuity, and the erection of a new building at Fonthill, where he continued to reside till 1822, when he sold his estate and house there, with all the contents, to Mr. Farquhar. His outlay upon the property had been, according to his own account, about £273,000, scattered over sixteen or eighteen years. Beckford now retired to Bath, where he erected another lofty building on the eminence called Lansdowne, to the north of that city. Till now his literary reputation had rested on his early tale of "Vathek," but in 1834 he again appeared as an author by the publication of an account of his first continental tour (in 1780), in a series of letters under the title of "Italy, with Sketches of Spain and Portugal." In the same year he republished his "Memoirs of Extraordinary Painters." The vivacity, polished sarcasm, and graphic power of these letters were instantly and strongly felt, and their appearance was followed the next year by another volume entitled "Recollections of an Excursion to the Monasteries of Alcobaca and Batalha," made in June, 1791. From this time Beckford continued to live in retirement till his death in 1844. He left two daughters, one of whom, Susan Euphemia, became Duchess of Hamilton.

BED, a place or an article of furniture used for resting, and more especially for sleeping at night. Among savages, nomadic, and partially civilized peoples the accommodation for sleeping is generally very slight in its character, a litter of dried leaves or grass, or the skin of an animal spread upon the ground, with a log of wood or a stone for a pillow, being regarded as quite sufficient for the purpose. In Gen. xlviii. 11 it is recorded of Jacob that while resting at night on his journey to Padan-aram "he took of the stones of that place and put them for his pillows;" and though such a proceeding seems strangely at variance with western ideas of comfort, the use of a large stone for a similar purpose is still common in Abyssinia and other places in the East. With the increase of civilization a higher standard of comfort was introduced, until in course of time the bed and bedstead became objects of luxury and display. Among the Jews the bed seems to have consisted generally of a mat, thick quilt, skin, or coarse mattress spread upon the highest part of the divan or raised bench erected against the sides and end of the room. Portable bedsteads, however, were not unknown, and these were sometimes used as a litter for carrying a sick person or as a bier for the dead. The covering of the bed among the poorer classes consisted of the outer garment worn during the day, hence the command (Deut. xxiv. 13) which required the restoration of the garment given in pledge at sunset, so that a man might sleep in his own raiment. Among the wealthy Jews beds and bedsteads of greater luxury were used. Movable bedsteads with crescent-shaped head rests were in use at an early period among the Egyptians, and are found figured upon their monuments. Among the Greeks and Romans the bedstead was often a very costly article of furniture, being made of valuable wood which was enriched by carving, inlaying, or plating with silver. The mattresses used were stuffed with wool, feathers, or down, and the coverings were richly ornamented.

In early English times the better classes used beds of straw, with coverings of skins, the bed being placed in a recess in the wall. The Normans introduced movable bedsteads, which were fitted with a covering over the top. At a later period the roof of the bedstead was attached to the wall, and in the sixteenth century the four post bedstead came into use. This massive piece of furniture, with its roof and curtains, is still common, but has given way to some extent to the more open forms known as the Elizabethan, Tent, or French. Bedsteads made of iron, brass, or a combination of these metals, have also come largely into use, with considerable advantage in the matters of cleanliness and ventilation. Iron has also been introduced with success in bed furniture, and mattresses are now made of tinued wire which is strongly interwoven, so as to make a very elastic fabric which yields to pressure in every direction. Mattresses containing spiral springs give a yielding comfortable couch, while avoiding the unhealthy warmth of the feather-bed; the use of the latter amongst people at once somewhat luxurious and yet prudent is quite superseded. Considerable ingenuity has also been shown in modern times in the construction of beds and bedsteads for the use of sick persons. Among these may be mentioned the Patent Lift and Rack Bedstead, designed for the raising and moving of persons who are helpless, without the trouble and fatigue involved when an ordinary bedstead is used. Air-beds and water-beds and water mattresses and cushions, which may be laid upon an ordinary bedstead, have also been introduced to a large extent, and have proved of very great value in prolonged illness or where there is great weakness.

BED OF JUSTICE (*lit de justice*) literally denoted the throne upon which the King of France was accustomed to sit when present in parliament, and from this original meaning the expression came in course of time to signify the parliament itself. Under the ancient monarchy of

France a bed of justice denoted a solemn session of the king in parliament for the purpose of registering or promulgating edicts or ordinances. According to the principle of the old French constitution the authority of the parliament, being derived entirely from the crown, ceased when the king was present, and consequently all ordinances enrolled at a bed of justice were acts of the royal will, and of more authenticity and effect than decisions of parliament.

BÉDARIEUX, a well-built manufacturing town in France, in the department of Hérault, 18 miles N. of Beziers. It is situated on the left bank of the Orb, which separates it from one of its suburbs, and had 9000 inhabitants in 1883. Fine and coarse woollens, cotton and woollen hosiery, silks, hats, soap, olive oil, leather, and paper are manufactured. There are also dye-houses, glass-works, and a copper foundry. The trade in wine and in the articles named is extensive and important.

BEDCHAMBER, LORDS AND LADIES OF THE, are officers whose salaries, like those of all officers of the royal household, are paid out of a fund appropriated for this purpose in the Civil List, and which is fixed by 1 Viet. c. 2, at £131,260 per annum. Each lady of the bedchamber waits upon her Majesty in turn, changing every fourteen days. The office of lady of the bedchamber is now almost a sinecure, except on state occasions. The queen, in 1839, asserted her right to select her ladies of the bedchamber and maids of honour against the claim to nominate them made by Sir Robert Peel, but she disposes absolutely of few situations in the royal household, although her pleasure must be taken on all appointments.

Chamberlayne, in his "Present State of England" (12mo, 1669, p. 249) thus speaks of the gentlemen of the bedchamber:—"The gentlemen of the bedchamber," he says, "consist usually of the prime nobility of England. Their office in general is, each one in his turn, to wait a week in every quarter in the king's bedchamber, there to lie by the king on a pallet-bed all night, and in the absence of the groom of the stole to supply his place." In the edition of the same work published in 1716, he adds, "Moreover, they wait upon the king when he eats in private; for then the cupbearers, carvers, and sewers do not wait. This high office, in the reign of a queen, as in her late Majesty's, is performed by ladies, as also that of the grooms of the bedchamber, who were called bedchamber women, and were five in number." Her Majesty Queen Victoria generally has ten or twelve ladies of the bedchamber, and eight bedchamber women, who take their turns of duty in order. Both the ladies of the bedchamber and the bedchamber women are allied to the nobility, and the office is one of high ambition, in consequence of the access it gives to the person of the sovereign.

The title of lords of the bedchamber appears to have been adopted after the accession of the House of Hanover.

BEDDINGTON, a village in Surrey, 3 miles from Croydon and 11 from London by the South coast Railway. It was at one time celebrated for its fine old house, the former residence of the Carews, with an Elizabethan hall of splendid design, and in which Queen Elizabeth was entertained for three days in 1599. In 1866 the house was rebuilt for the Female Orphan Asylum, which had previously been located in the Westminster Bridge Road, London. It is now a Gothic structure, rather heavy in appearance, and accommodates 200 children. It contains the original timber roof of the old mansion. The first orange-trees ever seen in England are said to have been raised at Beddington. The church is a graceful Perpendicular building, restored in 1852, and containing some fine brasses and elaborate monuments. In the vicinity are some gentlemen's seats of a superior description, and many handsome villas have been erected in what was formerly Beddington Park. The population in 1881 was 3007.

BED DOES, DR. THOMAS, a distinguished physi-

cian, was born at Shiffnal in Shropshire in April, 1760. His father, who was a tanner, wished to bring up his son to the same business; but his grandfather, perceiving the abilities which he early manifested, prevailed upon his father to educate him for some profession. In 1776 he entered at Pembroke College, Oxford, and soon became distinguished for his learning and his acquaintance with languages, both ancient and modern. In 1786 he took his degree of Doctor of Medicine at Oxford; and in the course of the following summer he visited France, where he became acquainted with Lavoisier and other celebrated chemists. On his return from the Continent he was appointed reader in chemistry to the University of Oxford, where he maintained the current doctrines of the day with considerable learning, ingenuity, and eloquence; but having expressed himself in favour of the partisans of the French Revolution, his opinions gave so much offence to the superiors of the university as to render his residence there no longer agreeable, and he resigned his readership in 1792.

Upon retiring from Oxford he took up his abode with a friend in Shropshire, where he wrote his "History of Isaac Jenkins," against drunkenness; and several medical works, which almost all refer to peculiar views respecting the possibility of curing diseases by breathing a medicated atmosphere. That the results did not correspond with the expectations of the founder of this new method is well known; but the undertaking was the means of bringing into notice the talents of Humphrey Davey, who was recommended to Dr. Beddoes by Mr. Gregory Watt as a fit person to superintend the chemical laboratory connected with the institution. Dr. Beddoes married a sister of the well-known authoress, Miss Edgeworth. He died in December, 1808, at the age of forty-eight.

BEDDOES, THOMAS LOVELL, son of the preceding (born in 1803, died 1849), was the author of several poems of much merit. Those best known are the "Bride's Tragedy" and "Death's Jest-book," both being dramatic in form, though not suitable for actual representation on the stage.

BEDE or BÉDA, THE VENERABLE, an English monk, whose talents and virtues procured him the title of *The Venerable*, was born about the year 672 in some village near the mouth of the river Tyne. We have his own authority that at seven years of age he was brought to the monastery of St. Peter, and committed to the care of Abbot Benedict, under whom and his successor Ceolfrid he was carefully educated for twelve years. In his nineteenth year he took deacon's orders, and in his thirtieth year, at the instance of Ceolfrid, his abbot, was ordained priest. The fame of Bede now reached even to Rome, and Pope Sergius made an earnest application to Abbot Ceolfrid that Bede might be sent to assist him in the promulgation of certain points of ecclesiastical discipline; but Bede, who was attached to his studies, remained in his monastery, improving himself in all the learning of his age, and directing his more particular attention to the compilation of an "Ecclesiastical History of the English Nation," the materials for which he obtained partly from chronicles, partly from annals, preserved in contemporary convents, and partly from the information of prelates with whom he was acquainted. Making allowance for the introduction of legendary matter, which was the fault of the age, few works have supported their credit so long or been so generally consulted as an authentic source. Bede published this history about the year 734, when, as he informs us, he was fifty-nine years of age; but before this he had written many other books on various subjects, a catalogue of which he subjoined to his history. He died in 735.

William of Malmesbury in his history ("De Gestis Regum," lib. iii. c. 3), and Simon of Durham in his account of the church of Durham (lib. i. c. 15), chiefly from the relation of one Cuthbert, a fellow-monk, have preserved

full accounts of the manner in which Bede died; whence we learn that the last stage of his distemper was an asthma, which he supported with great firmness of mind, although in much weakness and pain for seven weeks, during which time he did not in the least abate his usual employments in the monastery, but continued to pray, to instruct the younger monks, and to prosecute the literary undertakings which were still on his hands.

The "Historia Ecclesiastica" was printed for the first time about 1474. It is a volume of extreme rarity. King Alfred translated this history into Saxon, and the royal version, accompanied by the original Latin, was published first by Wheloe (folio, Cambridge, 1644), and subsequently by Dr. Smith, canon of Durham, with greater care (folio, Cambridge, 1722). An English translation of this history was first published at Antwerp in 1565 by Thomas Stapleton, a doctor of divinity of the University of Louvain, and has been followed by many and better versions. Entire editions of Bede's works have been published at Paris (1544-54), Basel (1563), and Cologne (1612, 1688).

Those treatises of Bede's which are mentioned in his own catalogue of his works were published by Mr. Wharton, from three MSS. in the valuable library in the archiepiscopal palace at Lambeth.

BEDEGUAR is a very pretty kind of GALL, generally found on the sweet-briar, and hence called the sweet-briar sponge. There are several larvæ in the centre, each in a separate cell.

BEDE-HOUSE, a term used for an almshouse. A *bedes man* or *beds-man* is a person who resides in a *bede-house*, or is supported from the funds appropriated for this purpose. *Bede* is the Anglo-Saxon word for prayer, and as almsmen were bound to pray for the founder of the charity, they were hence called *beds-men*.

BEDELL, WILLIAM, Bishop of Kilmore in Ireland, was born in the year 1570 at Nottley in Essex. He matriculated in 1581 as pensioner of Emmanuel College, Cambridge. He entered early into holy orders, and in 1593 he was chosen fellow of his college. For a few years he had a church at St. Edmundsbury, but went afterwards as chaplain to Sir Henry Wotton, the English ambassador to the state of Venice, about the year 1604, and remained with him eight years.

On his return to England, his Calvinistic opinions prevented him from obtaining the preferment which he merited, but in 1615 he was presented to the living of Horingsheath, in which he remained twelve years, producing translations (of Sarpi's "History of the Council of Trent," &c.) and original works from time to time.

Bedell's fame at length reached Ireland, and in 1627 he was unanimously elected provost of Trinity College, Dublin. He was advanced to the united sees of Kilmore and Ardagh in 1629, being then in the fifty-ninth year of his age. He caused the Common Prayer, which had been translated into Irish, to be read in the cathedral in his own presence every Sunday. The New Testament, translated into Irish by William Daniel, afterwards Archbishop of Tuam, and the Old Testament, which King translated from the English, Bedell revised, and compared them with the Greek and Hebrew. He also revived the ancient episcopal jurisdiction, and although he was formally stopped in these proceedings by the Court of Chancery, his fame for uprightness had gained such universal respect that the surrogate appointed was instructed in all things to be guided by the bishop. We learn from his life by Bunnet that when the rebellion broke out in October, 1641, the bishop was so popular in his neighbourhood that he was at first almost unmolested by the Irish, but he was at length seized, imprisoned in the castle of Clonghoughter, and treated with great severity. He was afterwards detained, with more attention to his comfort, in the house of the Protestant clergyman, Dennis Sheridan. Here every Sunday he read the prayers

and lessons, and preached himself, till his death in his seventy-first year, in 1642.

BEDFORD, a borough, and the county town of Bedfordshire, is situated on both sides of the river Ouse, which is navigable to the German Ocean. Bedford is 48 miles N.N.W. from London by road, and 47 by the Midland Railway. The town is of high antiquity, and is generally supposed to be the *Bedicanford* (i.e. the ford of the *bedged* or fortified place) of the "Saxon Chronicle." It suffered greatly in the wars between the Saxons and the Danes. A very strong castle was built adjoining the town, which sustained a siege against King Stephen and his army in 1137. In 1216 it was surrendered to King John, who bestowed it on his favourite, Faukes de Brent. Faukes, having repaired and greatly strengthened his castle, presumed so far upon its impregnable character as to set all law and authority at defiance. His outrages and depredations on his less powerful neighbors were such that in 1224 Martin Patersbul, Thomas de Moulton, and Henry Braybrooke, the king's justices itinerant, then sitting at Dunstable, fined him in the sum of £3000. Faukes sent his brother at the head of a party of soldiers to seize the judges, and bring them prisoners to Bedford. Two of them escaped, but Braybrooke was taken and carried to the castle, where he was shamefully treated. The king (Henry III.), being highly incensed at this and the other outrageous conduct of De Brent, determined on bringing him to punishment. He therefore marched to Bedford in person, attended by Stephen Langton, archbishop of Canterbury, and the principal peers of the realm. After a vigorous resistance of sixty days the castle surrendered at discretion. Faukes himself had escaped from the castle before it surrendered. He took sanctuary in a church at Coventry, and obtained the king's pardon on condition of abjuring the realm. His brother William, the acting governor of the castle, with twenty-four knights and eighty soldiers, were hanged.

Bedford was a borough and corporation by prescription; but it is now, under the Municipal Reform Act, divided into two wards, with six aldermen and eighteen councillors (one of whom is mayor), and has a commission of the peace. The population of the municipal borough (which is now identical with the parliamentary) in 1881 was 19,533. Bedford has sent two members to Parliament since 1295, but its representation was reduced to one member by the Redistribution Act of 1885.

The neighbourhood being very productive in wheat and barley much business is done in the corn trade; there is also a very considerable trade, by means of the Ouse, in malt, coals, timber, and iron. A new corn exchange was erected in 1874. Lacemaking affords employment to a great number of females and children; and the town contains the largest agricultural implement manufactory (the Messrs. Howard's) in the kingdom.

Bedford is surrounded by pasture land on every side. The bridge over the Ouse is a handsome structure of five arches. The town was formerly rather badly drained, but in 1868 waterworks were constructed, and a subterranean brick tank built capable of storing 400,000 gallons, about double the average daily consumption of the town. With the waterworks an efficient scheme of drainage was embodied, including the utilization of the sewage by its application as a fertilizer to some meadows near the town.

Bedford is divided into five parishes, and contains five parish churches, the largest of which, that of St. Paul, contains some handsome Gothic architecture of different periods. There are several chapels belonging to the Independents, Methodists, Baptists, Roman Catholics, and the United Brethren (Moravians); the shire-hall, a good stone building; county gaol (on the site of that in which Bunyan wrote his "Pilgrim's Progress"), &c. The "Bunyan" (Congregational) Chapel was rebuilt in 1849, on the site of

a former chapel erected in 1707, called "the Old Meeting," which stood on the spot where Bunyan was accustomed to preach in a still earlier chapel, built in 1671. His chair is preserved in the vestry of the present building, at the entrance to which are a pair of massive bronze doors, their ten panels a work of high art, illustrating passages in the "Pilgrim's Progress." A handsome building contains a public library, news-room, ball-room, savings bank, and rooms for lectures, &c. The town also has a lunatic asylum and a general infirmary. In proportion to its size Bedford has more public endowments than any other place in the kingdom. Sir W. Harper, lord mayor of London, in 1561, founded a free school in his native town of Bedford, and left an estate in Holborn Fields for its support and for the portioning of poor maidens—the surplus, if any, to be given to the poor. The value of the property has so much increased that the annual income derived from the estate is now upwards of £16,000, and so much eleemosynary aid had an injurious influence on the independence of the poorer classes of the town. Since 1874, however, the income has been spent entirely in education, with the exception of sufficient to maintain fifty almshouses. Large handsome schools have been erected, and there are classical, commercial, and preparatory schools in separate establishments. The classical school is under the supervision and control of the warden and fellows of New College, Oxford. There are exhibitions of £80 each per annum to either of the universities of Oxford, Cambridge, Dublin, London, or Durham, to be held for four years. In the commercial school the education is of a liberal character, and two prize premiums of £50 each per annum, to be held for four years, are awarded annually. Many families are attracted to the town by the cheapness of education in these foundation schools, for whom numerous villas have been built on the west side of the town. A handsome public park in a most eligible locality, and over 60 acres in extent, was secured to the town from part of the estate of St. John's Hospital, by virtue of an Act of Parliament passed in 1881. John Bunyan and John Howard were natives of Bedford. A handsome monument to the former was erected by the Duke of Bedford in 1874. In the library of the town is preserved a black-letter copy of Foxe's "Book of Martyrs," which was in Bunyan's possession while in prison, and which contains his autograph and some verses in his handwriting.

BEDFORD, DUKE OF, Regent of France. John Plantagenet, duke of Bedford, was the third son of Henry IV. and Mary Bohun, daughter of the Earl of Hereford. He was created Duke of Bedford in the second year of the reign of his brother, Henry V. During the lifetime of his father he was governor of Berwick-upon-Tweed, and warden of the Scottish Marshes; and during his brother's absence in France he was governor and commander-in-chief of the forces in England.

Henry V. died after a short illness in 1422, at the early age of thirty-six years, leaving an infant successor only nine months old, with the disputed honour of King of France as a portion of his inheritance. On his death-bed he expressed his earnest desire that Bedford "should take up the administration of the affairs of France" during the minority of the young king, leaving the less difficult administration of affairs at home to the conduct of his younger brother Gloucester, under the title of Protector. In love of martial glory and in military talents the Duke of Bedford was little, if at all, inferior to the deceased hero; but though he obtained considerable successes, the efforts of Joan of Arc abroad, and the prevalence of faction at home, thwarted all his measures, and the realm of France was gradually wrested from the yoke of England. A treaty between the French king Charles and the Duke of Burgundy was at length concluded in 1435, which so affected the regent that he died of mortification and anxiety on the 13th September, a fortnight before the treaty was

formally signed. This Rouen treaty, as Bedford foresaw, gave a fatal blow to English interests in France.

Like most of the immediate descendants of John of Gaunt the Duke of Bedford was a patron of literature. He purchased and transported to London the Royal Library of Paris, which Charles V. had increased to "900 volumes;" and his brother Gloucester presented 600 books to the University of Oxford, 120 of which cost £1000.

The dukedom of Bedford is at the present time in the Russell family.

BEDFORD LEVEL. This district comprehends nearly the whole of a large tract of flat land, extending into the six counties of Northampton, Huntingdon, Cambridge, Lincoln, Norfolk, and Suffolk. It is bounded on the N.E. by the German Ocean, and on all other sides by highlands which encompass it in the form of a horse-shoe. Its length from Teynton in Lincolnshire to Milton in Cambridgeshire is 60 miles, and its breadth from Peterborough in Northamptonshire to Brandon in Suffolk is nearly 40 miles. The tract thus described includes that part of the south-east division of Lincolnshire called Holland, which consists of flat, low, marshy land, and is supposed to have been reclaimed from the sea by embankments made during the Roman occupation of Britain. The Level extends to the north only as far as Tydd-St.-Giles; its length thence to Milton, on the south, is about 33 miles. The boundary line is irregular; its course on the south from Brandon to Peterborough may be traced by Mildenhall to a short distance north of Newmarket, then by Milton in Cambridgeshire to Earith on the borders of Huntingdonshire, Ramsey, Woodwalton, and Yaxley in the latter county. Returning from Peterborough to Brandon, on the north, the boundary line runs by Peakirk, 6 miles north of Peterborough, Crowland, Whaplode, Grove Chapelry, Parson Grove, Gnyhirn, Salter's Lode on the Ouse, about 10 miles south of Lynn, and thence by Methwold to Brandon. The Level is divided into three parts, which are distinguished as the North, the Middle, and the South Levels. The North Level lies between the rivers Welland and Nene; the Middle Level, between the Nene and the Old Bedford river; and the South Level extends from the Old Bedford river to Stoke, Felwell, and Mildenhall. It will be thus seen that the district known as the Bedford Level comprises the greater part (amounting altogether to 450,000 acres) of the marshy district called the *Fens*.

This tract of land has, in the course of centuries, undergone remarkable changes. There is abundant evidence to prove that it was once a forest, and that it then became a stagnant morass. It was probably a forest in the time of the Romans, who cut down most of the trees, and made roads through the fens. In the thirteenth century many irruptions of the sea covered this district with water; and as the dams and drains were ill managed the spot became an unhealthy stagnant morass, either watery or boggy. Through this morass the Nene, the Welland, the Ouse, and other rivers found their way to the sea.

For many centuries the draining of this morass occupied public attention. Embankments and drains were made from time to time, but the works were inefficient. At length, in 1634, the Duke of Bedford made an agreement with Charles I. that a company would drain a large portion of the morass, on condition of having some of the reclaimed land for themselves. More than £1,000,000 were spent, and many miles of canals and embankments made. After £400,000 had been laid out the company received 95,000 acres of the reclaimed land; but it was less in value than the actual amount expended.

A regular system was now established for preserving the reclaimed land, and for improving the draining. A royal charter was granted in 1664, by which the undertakers for the draining were incorporated, and regulations were framed for the management of the 95,000

acres allotted. This corporation has since been kept up, and consists of a governor, six bailiffs, twenty conservators, and a commonalty. The corporation is empowered to impose and levy taxes for the preservation of its land, and for upholding the ways, passages, rivers, cuts, drains, banks, &c., throughout the Level, which are also the property of the corporation. The governor and bailiffs must each possess at least 400 acres of the land granted to the corporation to qualify them for holding those offices. The qualification requisite for the conservators is 290 acres; such of the commonalty as possess each 100 acres are allowed a voice in the election of the officers of the corporation.

At the original allotment of the 95,000 acres the adventurers received assignments proportioned to the sums which each had contributed; so that the whole assignment is not held in common, but each owner holds his allotment or purchase subject to the laws and restrictions of the corporation. At the time the charter was granted by Charles II., that king reserved 12,000 acres for himself out of the 95,000; but this proportion was subject to the same management as the rest of the allotment.

At various times, during the last two centuries, extensive works have been carried on to effect a better drainage of this large flat region by the construction of artificial rivers. The principal of these was completed under Acts passed in 1827 and 1829 for improving the outfall of the river Nene; for the drainage of the lands discharging their waters in the Wisbech River; for improving the navigation of the Wisbech River from the upper end of Kinderley's Cut to the sea; and for embanking the salt marshes lying between Kinderley's Cut and the sea. Under these Acts a new tidal channel was cut for the discharge of the waters of the Nene into the sea. Several thousand acres of marshland were thus reclaimed. The old channel afforded only a tedious and dangerous passage, and that too at spring tides, and with a favourable wind to vessels of about 60 tons burden, drawing about 6 feet water. The new channel affords a safe and uninterrupted communication between Wisbech and the sea at all states of the tide, and in all weathers, for vessels of the above burden, and at spring tides for ships of much larger dimensions.

Various auxiliary means have been used for the complete drainage of the Level. In many parts windmills were erected for raising and carrying off the water, but steam engines have now to a great extent superseded them. In the North Level the drainage is effected without either windmills or steam engines.

Abundant crops of grain, flax, coleseed, and various other kinds of produce, are now raised in the Bedford Level.

BEDFORDSHIRE, an inland county of England, of very irregular shape. It lies between $51^{\circ} 49'$ and $52^{\circ} 21'$ N. lat., and $0^{\circ} 8'$ and $0^{\circ} 41'$ W. lon. It is bounded on the N.E. by Huntingdonshire, on the N.W. by Northamptonshire, on the E. by Cambridgeshire, on the W. and S.W. by Buckinghamshire, and on the S.E. and S. by Hertfordshire. Its greatest length is $36\frac{1}{2}$ miles, measured nearly N. and S., and its greatest breadth is $22\frac{1}{2}$ miles, measured nearly E. and W. Bedford, the county town, is situated near the centre of the county. The area of the county is 295,582 acres. It is the smallest county in England, except Huntingdon, Middlesex, and Rutland. The population in 1871 was 146,257; in 1881 it had increased to 149,473. The females exceeded the males by more than 9000.

Surface, Rivers, &c.—Bedfordshire has no highlands of any great extent. The range of the Chiltern Hills (under the name of the Dunstable and Luton Downs) crosses it in a N.E. direction near Dunstable, separating the basin of the Thames from that of the Ouse. Another ridge, having the same general direction, extends from Ampthill to near the junction of the Ivel with the Ouse. Some hills, between which the Ouse winds its course, and

in which some of its feeders take their rise, occupy the north-west parts of the county. Between these hills and the Ampthill ridge is the vale of Bedford, a corn district of considerable extent. The woodlands are chiefly of modern origin, having been planted during the latter part of the last century; they consist chiefly of oak, Scotch fir, larch, and underwood of various kinds.

The range of the Chiltern Hills consists of chalk, and is skirted along its north-western boundary by a belt of indurated chalk-marl, much covered by the debris of the chalk hills. This chalk-marl yields good lime by burning. Iron-sand, fullers' earth, Oxford clay, and Cornbrash limestone, are among the geological strata of the county. Many fossil remains have been found in the Oxford clay.

The chief river is the Ouse, which, approaching the county from Buckinghamshire, and forming for a short distance the boundary of the two counties, crosses Bedfordshire with a very tortuous course. It is navigable from Bedford to the sea at King's Lynn. Among the other Bedfordshire streams are the Ivel, the Lea, and the Ouzel, all of which abound in fish.

The county has water communication towards the north and east by the Ivel and the Ouse rivers. The county is well supplied with railway communication; the Midland, the North-western, and the Great Northern lines, with their branches, intersecting it in all directions.

Climate, Agriculture, &c.—The climate of this county, partaking of that of the interior of England, is not so wet as that of the western coast, nor so much exposed to cold winds as the eastern maritime counties. The air in general is mild and healthy, somewhat keen on the chalky hills, and moister on the cold wet clays. The soil varies greatly. On entering the county from the south it is composed of chalk, covered with a very thin layer of earth, which is consequently nearly in a state of nature, and only fit for sheep-walks. On descending the hills there occurs a mixture of chalk and clay, known by the name of "white land," which is stiff but tolerably fertile. In other parts of the county are found clay loams, sand, stiff soils, and rich loam earth, giving rise to much diversity of produce, especially for garden vegetables, near Bedford and Biggleswade.

The land is extremely fertile in the Vale of Bedford, as it is called, in the neighbourhood of the Ouse. Through the liberal encouragement given by the Duke of Bedford and other landlords the system of husbandry has much improved in recent years, and several model farms have been established. The farm buildings are extensive and commodious; and there are also good cottages, with allotments attached, for the labourers. Generally the farms are of medium size, the average not exceeding 200 acres. According to the official agricultural statistics published in 1885 there were 260,000 acres, or about five-sixths of the entire area, under cultivation in that year. The chief crops were wheat, 48,000 acres; barley, 32,000; clover, 20,000; and permanent pasture, 81,000.

There are a few meadows along the course of the rivers Ivel and Ouse which are occasionally flooded. Where the subsoil is gravelly and porous the herbage is good and abundant; where it is composed of clay, and there is not a very ready channel for the water to run off, the herbage is coarse and full of rushes.

There is nothing remarkable in the cattle and sheep in this county, there being no indigenous breeds of either. The pigs reared and fattened are mostly of the Berks and Suffolk breeds.

The only branches of manufacture, besides that of agricultural implements at Bedford, are pillow lace, worked by the country people; straw-plait at Dunstable and Luton; and matting from the rushes of the Ouse, &c.

The county is in the diocese of Ely. The assizes and sessions are held at Bedford, which is also the chief place for the election of the two members for the shire. The

total number of voters on the county register in 1884 was 7300. The chief towns are Bedford, Luton, Leighton Buzzard, Dunstable, and Biggleswade.

Civil History and Antiquities.—At the time of the Roman invasion Bedfordshire appears to have formed part of the territory of the Catteuclani, a people conjectured by Camden to be the same as the Cassii, mentioned by Cæsar among the tribes who submitted to him during his second invasion of the island. In common with the other inhabitants of South Britain they fell under the Roman domination. Three roads (the Watling Street, Ikeneld Street, and a Roman military road) crossed this county; and several camps or earthworks still remain. At or near the village of Sandy or Saludy, about 3 miles north of Biggleswade, is supposed to have been the British or Roman town called *Salenni* by Ptolemy; and in various parts of the county are other ancient earthworks and inclosures.

In the struggle maintained by the Britons against their Saxon invaders, and again by the Saxons against the encroachments of the Danes, Bedfordshire appears to have been the scene of violent contest. At one time it formed part of the kingdom of Mercia. In 1009 and 1010, during the war between Ethelred II. and Sweyn, king of Deunark, the Danes invaded this county. In the latter of these years they burned Bedford and Teneosford, but in 1011 the county returned to the sway of Ethelred. Nearly all the baronial castles of Bedfordshire were destroyed in the reign of King John, so that the county took little part in subsequent civil wars.

Bedfordshire possessed several monastic establishments, among which were Elstow Abbey, near Bedford, for Benedictine nuns, founded in the time of William the Conqueror by his niece Judith; Dunstable Priory, for Black canons, founded by King Henry I. in the latter part of his reign; Wadon or Warden Abbey, founded by Walter Espee in 1135, for Cistercian monks; Woburn Abbey, Chicksands Priory, near Shefford, and Newenham Priory, near Bedford. There were many minor establishments, monasteries, nunneries, &c. Of these monastic establishments there are no considerable remains, except of Dunstable Priory, Elstow Abbey, Newenham Priory, and Chicksands Priory. The most distinguished residence in the county is Woburn Abbey (the seat of the Duke of Bedford).

BEDLAM. See BETHLEHEM HOSPITAL.

BEDLAM BEGGARS, or Tom-a-Bedlams, were names formerly given to such patients of the lunatic hospital of Bethlehem as, being partially cured, were allowed to go at large. They were distinguished, Aubrey says in his "Remains of Gentilisme," by having fastened on their left arm "an armilla of tin printed, of about 3 inches breadth." A graphic description of these beggars is given in Shakespeare's "King Lear," Act ii. sc. 3, where Edgar resolves to assume the character to escape punishment.

BEDLIS. See BITLIS.

BEDNUR, a village in the territory of the Rajah of Mysore, near one of the passes of the Western Ghats. It was taken by Hyder Ali in 1763, when it is said to have contained 20,000 good houses, besides huts, and to have yielded a booty of £12,000,000. The ground on which it stands being very uneven the town was never closely built, and it occupied an area the circumference of which was 8 miles. The place was defended by a circle of woods, hills, and fortified defiles. Hyder built some new works, and also a palace, but as the palace was commanded by neighbouring hills it could never have offered much resistance. Hyder held out much encouragement to merchants, and the trade of the place increased greatly. In the beginning of 1783 the town was taken by the English, under General Matthews. The attack made upon Bednur by Tippoo Sultan, in the month of April following, appears to have taken the English quite by surprise, and Tippoo made an easy conquest. The whole town was burned during the

engagement which preceded the capitulation. The palace was rebuilt by Tippoo, and the town partly restored; but the materials were only timber and mud, and as the rains are excessive the houses were ill suited for lasting. The population is now only about 1400.

BEDOUIINS. See ARABIA.

BEE. The earliest records testify to man's appreciation of the wisdom of bees, and the value of the stores which they so industriously provide. In the Bible, in Hindu mythology, in representations of Persian worship, on coins of Athens and Ephesus, we find references to the bee as a symbol of fecundity. It is figured in the Egyptian hieroglyphs as denoting a people obedient to a king, and Virgil expresses the same idea in his book on bees, the Fourth Georgic—

"Præterea regem non sic Ægyptos et ingens
Lydia, nec populi Parthorum aut Medus Hydaspes
observant."

Bees are said to have swarmed on the lips of Pindar and Plato, omens of the sweetness of the words which embodied some of the ever-varying charms of nature. Xenophon was called the "Attic Bee," and Sophocles pre-eminently "the Bee." Romans as well as Greeks perceived the appropriateness of the figure; e.g. Horace has "more apis Mantinea." The habits of the bee, symbolized in this way by the wisdom of the many, have been more deeply investigated by the philosophy of the few; amongst others Aristotle, Aristomachus, Virgil, Huber, Dzierzon, Von Siebold, F. Smith, Lubbock, and Hunter have contributed to our knowledge of the subject.

Bees are insects belonging to the order HYMENOPTERA, and like most members of the class undergo metamorphoses which divide the whole life into four well-marked stages—the egg, larva, pupa, and imago. The embryo coiled up in the egg is of a worm-like form marked with transverse lines, which divide it into sixteen segments. The first segment at one end puts out a small lobe at each side, and appendages soon appear on these which in the future become the antennæ. Appendages also appear on the lower side of all the segments; those on the first segment unite to form the *labrum* or upper lip; those on the next three segments are rudimentary *mandibles*, and two pairs of *maxillæ* or "jaws." The next three segments represent the future thorax, but the buds on these and the slightly different buds on the remaining segments degenerate, and all trace of them is lost before the embryo is hatched. These larvæ, which have lost the legs they possessed while still in the shell, are carefully tended and fed with pollen by nurses; on the other hand, some other hymenopterous larvæ—e.g. those of the saw-fly—are not nursed, but use their six front legs and the abdominal pro-legs in moving about the leaves which form their food. From a consideration of these facts Lubbock and Weismann have been led to the conclusion that bees are descended from ancestors which had larvæ similar to those of the saw-fly, and that the present legless condition of these larvæ is not original, but results from their mode of life. Bütschli considers the parts of the sting to be related genetically to the appendages of the last two segments. On the upper side of the second and third thoracic segments appendages appear which afterwards become wings, and are therefore supposed by Gegenbaur and Lubbock to be modifications of tracheal gills.

In the larva the antennæ are still quite small; the *labrum* folds down over the small jaws which work from side to side. There is an appendage below these on each side, with a hair-like process at the end; and in the centre beneath there is a fleshy protuberance with a small hole, through which is emitted the viscid liquid with which the larvæ of some kinds spin their cocoons.

The pupa is inactive. At first it is semitransparent, and the future parts of the mature insect can be readily traced, each encased in a thin skin.

The imago has the well-known insect form [see INSECTS] consisting of head, thorax, and abdomen, with two antennæ, two pairs of wings, and three pairs of legs. The wings are of the true hymenopterous type [see HYMENOPTERA], membranous, with few veins. They are connected together—to form, as it were, one wing—by a row of hooks on the front edge of the hind wing fitting into a fold in the hind edge of the fore wing. When disconnected they can be laid one above the other close on the back, so that the bee can pass narrow ways in search of honey and in forming her nest. (See Staveley's "British Insects," p. 50.) The abdomen of the females is furnished with a sting, and thus bees are included with the wasps and ants in the group Aculeata (*aculeus*, a sting), and separated from other hymenoptera, such as the gall-flies, saw-flies, and ichneumons, in which the *ovipositor* is not connected with a bag of poison.

A characteristic of bees is the adaptation of the hind legs for the purpose of carrying pollen; the basal joints of the tarsi are enlarged and more or less flattened, and it is interesting to trace the degree to which this has taken place as we pass from the solitary bees, such as *Prosopis*, to the humble and hive bees. The various kinds of bees form by themselves a section of the aculeate hymenoptera, under the heading *Melifera* (Lat. *mel*, honey; *fero*, to carry) or *Anthophila* (Gr. *anthos*, flower; *philos*, loving). The variations which occur in the parts of the mouth are useful in distinguishing the genera. The labrum and mandibles resemble those of other insects; but the labrum and maxillæ, as in other Hymenoptera, are modified to form an instrument by means of which they can suck up the nectar of flowers. Bees are divided into two families, the Andrenidæ and the Apidæ. In the former (fig. 1) the ligula or tongue, *a*, is short and flat, and is folded only once under the mouth when in repose, while the labial palpi, *c*, are composed of four nearly equal joints. In the Apidæ (fig. 2) the ligula, *a*, is long and slender, folded twice under the mouth, and the labial palpi, *c*, have two long and two short joints. The antennæ are of the type called geniculate (*genu*, knee), consisting of one or two long joints followed by a few short joints, with an angle or knee formed after the first joint. They seem to be of the utmost importance to bees. Huber mentions a case where a queen bee, deprived of her antennæ, lost all precision in her movements; she dropped her eggs at random, could not feed properly, and forgot the instinct of attacking another queen. In the males they consist of thirteen joints, and only twelve in the females. There are two large compound eyes, and three ocelli or simple eyes on the top of the head. From experiments made by Sir J. Lubbock ("Ants, Bees, and Wasps," 1882) it appears that bees can distinguish colours, and that they show a preference for blue. As regards the sense of smell, it seems to be well developed. Sir John placed some eau de Cologne in front of the hive, and found that the bees at first were attracted to it. Bee-masters are of the opinion that bees know those which belong to their own hive by their smell, and take the precaution, when they wish to mix the members of two hives, of scenting them with peppermint or tobacco-smoke. Huber was evidently of the opinion that bees discovered honey, which he had concealed, by their sense of smell; and this is the natural method, according to authors, by which the treasures hidden in deep corollas of flowers are found out. On the other hand, Lubbock's experiments show that unless bees see others feeding, or taste the honey themselves, they do not appear to notice it even when close to it. It may be that the evaporation of the eau de Cologne caused currents in the air easily perceived by bees; and the fact that it is possible to mix two hives may be due to the action of scents in other ways than by smell. To postulate the possession of this sense in order to explain the discovery of honey in flowers is scarcely necessary, if we consider

that bees naturally go where they see others feeding, and that the habit of searching flowers has become instinctive.

Experiments have been made by Sir J. Lubbock with reference to the power of hearing. Some bees were trained to come to honey which was placed on a musical box on the lawn close to a window. The musical box was kept going for several hours a day for a fortnight. It was then brought into the house and placed out of sight, but at the open window, and only about 7 yards from where it had been before. The bees, however, did not find the honey, though when it was once shown them they came to it readily enough. Other experiments with a microphone were without results. Bees when swarming were popularly, and had been ever since the time of Aristotle, supposed to be influenced by clanging kettles, &c. Experienced apiarists are now disposed to doubt whether the noise has

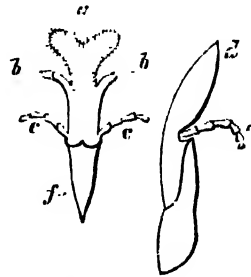


Fig. 1—*Colletes*.

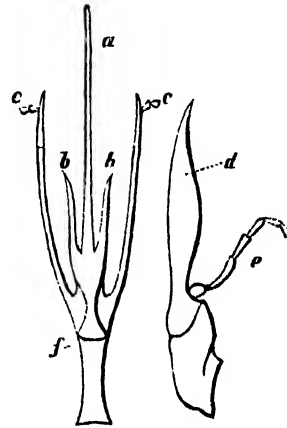


Fig. 2—*Anthophora*.

a, ligula; *b*, paraglossæ; *c*, labial palpi; *f*, mentum; *d*, maxilla; *e*, maxillary palpus.

really any effect, but Sir J. Lubbock suggests that even if it has, it is possible that what the bees hear are not the loud low sounds, but the higher over-tones at the verge of, or beyond, our range of hearing. Huber observed that the queen bee answered to the piping sound made by a young queen bee while still imprisoned in the cell, and that she could strike consternation into the workers by a peculiar humming note.

In the following brief notices of some of the genera of bees, prominence is given to types found in this country; and for information with respect to them we are indebted to Mr. F. Smith's "Catalogue of the British Hymenoptera," published by the British Museum.

The Andrenidæ are solitary or live in colonies, and consist of males and females; the latter collect pollen

from flowers, which, with the addition of a little honey, they form into a kind of paste, which is the food of their grubs. They burrow in the ground, and deposit an egg on a supply of this paste sufficient for the rearing of the grub. The bees belonging to the genera *Colletes* and *Prosopis* have bilobed tongues (fig. 1, a). *Colletes* has hairs on the thorax and abdomen. These insects form large colonies. They make burrows which are from 8 to 10 inches in length, and at the further end are lined with a very thin, transparent, membranaceous covering, resembling gold-beaters' skin. "The insect having stored up a sufficient supply of pollen and honey in a semifluid state, closes up the cell with a cap of the same substance as the lining of the tube. This cap is stretched flat across, like the parchment on a drum-head; a little within she next constructs a concave cap, serving as the end of the cell; her former labour is then repeated until she has furnished six or eight cells, when the whole is completed" (F. Smith). There is little doubt that the same bee constructs more than one of these tubes, as there is never any trace of a second tunnel running into the first, as in many other solitary bees. These bees are liable to the attacks of two parasites, one of which feeds on the larva, while the other eats the pollen. The first is a fly (*Mitogramma punctata*); this fly may frequently be seen entering the cells of the bees, and indeed it has been often bled from the cocoons of the *Colletes*. The second enemy is a little bee (*Epeolus variegatus*). The greatest enemy of these bees, however, is the earwig, which commits wholesale slaughter on them, devouring pupae, larvæ, and pollen, and in some localities they abound to such an extent that three-fourths of the bees perish from their attacks. The bees of the genus *Prosopis* are without hairs, and differ from *Colletes* in their solitary habits. They construct cells in bramble-sticks.

In the remaining genera of this family the short tongues are pointed. The species of *Halictus* are found in every quarter of the globe. *Halictus minutissimus* is only one-sixth of an inch in length. The species of *Andrena* are all burrowers in the ground, some species preferring banks of light earth, while others prefer hard-trodden pathways. The burrows vary in length; they are seldom less than 6 inches, whilst others excavate tunnels in the ground from 9 to 10 inches in length. At the bottom of each burrow they form a small oval chamber, in which the female lays up a small pellet of pollen mixed with honey. These pellets are generally about the size of a pea, varying in the different species. The bee sometimes constructs branch tunnels, with a similar chamber at the end. When the egg is deposited the bee closes the mouth of the tunnel. These bees are subject to the attacks of various parasites. The bees of the genus *Nomada* are parasites, and appear to be on a perfectly friendly footing with the industrious bees, being permitted without let or hindrance to enter their burrows. "It has been advanced as a proof of the ingenuity and artifice necessary to be employed in effecting the deposit of their eggs in the working bees' nests, that the parasites should bear a close resemblance to the bees upon which they are parasitic. Some instances may undoubtedly be advanced, as *Apathus* and *Bombus*, and also in the different species of *Volucella* which infest the nests of humble bees; but amongst the solitary bees no such resemblance is required to aid in any necessary deception. . . . Colonies of *Andrenidæ* and their parasites mingle together in perfect harmony, issuing from and entering into the burrows indiscriminately. . . . Between *Eucera* and *Nomada* no resemblance exists in general appearance, one being several times larger than the other, and covered with pubescence of a sombre colour; whereas the parasite is a gaily-coloured insect, destitute of pubescence, and readily observed from the brightness of its colouring." To some extent a constant connection between certain species exists; and some species of these parasites

are always found in connection with certain species of *Andrena*. Bees belonging to the genus *Andrena* may be recognized by a tuft of hairs on the trochanter of the hind legs. *Cilisa hamorrhoidalis* is found in the month of August "where the blue-bells grow, for it does not appear to frequent any other flower." *Dasygaster hirtipes* derives its name from the long dense brush of fulvous hairs on the hind legs. It is a very beautiful insect.

The bees belonging to the family *Apidæ* are more variable in their habits than the *Andrenidæ*. Many excavate cells in wood; some usurp the nests of other species; some appropriate any convenient recess; some live in colonies, each in her own home; some form a republic, others a monarchy, under the one roof. There are two species of the genus *Panurgus* in Britain. In structure they are very similar to the *Andrenidæ*; the females possess the brush on the tibiae and the apical fringe on the abdomen, and their tarsi are similar. The chief difference lies in the tongue being folded at the tip when in repose. They excavate burrows, and lay up a store of pollen and honey, like the *Andrena*. They are summer bees, and black in colour. The bees of the genus *Nomada* are popularly called wasp bees, from a close resemblance they have in their gay colouring to some of the smaller wasps. The body is elongated and smooth; the legs are simple in both sexes. The maxillary palpi are six-jointed. The bees of this genus deposit their eggs in the nests of other bees. Mr. Smith thinks it probable that the parasite closes its cell, having "frequently captured *Nomada* and *Melecta* with masses of clay attached to their posterior tibiae; and in the well-known genus of exotic parasitic bees, *Crocis*, specimens are of frequent occurrence which have masses of clay or mixed earth on their tibiae." Twenty-four British species are described; one of these (*Nomada solidaginis*) is often very abundant on the ragwort and wild thyme. *Nomada xerfasciata* is parasitic on the bee called *Eucera longicornis*. Other parasitic genera are *Epeolus*, *Cerioxys*, *Stelis*, *Melecta*. Of these *Melecta lactuosa* is a beautiful jet-black bee, spotted with snow-white.

Of the genus *Osmia* ten species are British. *Osmia bicornis* is the most abundant species in this country; the female is armed on each side of the head with a stout horn. This pretty bee varies its economy according to circumstances. "In hilly country or at the sea-side it chooses the sunny side of cliffs or sandy banks, in which it forms its burrows; but in cultivated districts, particularly if the soil be clayey, it selects a decaying tree, preferring the stump of an old willow. It lays up a store of pollen and honey for the larvæ, which when full grown spin a tough dark-brown cocoon, in which they remain in the larva state until the autumn, when the majority change to pupæ, and soon arrive at their perfect condition. Many, however, pass the winter in the larva state." *Osmia leucomelana* selects for her nest the dead branches of the common bramble, and removes from them the pith, usually to the depth of from 5 to 6 inches. The two most interesting species found in these islands are the *Osmia aurulenta* and *Osmia bicolor*. These bees generally burrow in banks, particularly the latter, which forms colonies. "It appears to be the natural habit of these species to construct tunnels in hard banks with great labour and untiring perseverance; still we find them at times exhibiting an amount of sagacity and a degree of knowledge that at once dispels the idea of their actions being the result of mere blind instinct, impelling them in one undeviating course. A moment's consideration will suffice to call to mind many tunnels and tubes, ready formed, which would appear to be admirably adapted for the purposes of the bee—for instance, the straws of a thatch and many reeds; and what could be more admirably adapted to their requirements than the tubes of many shells? So thinks the bee! *Osmia aurulenta* and *Osmia bicolor* both select the shells of *Helix hortensis* and *Helix nemoralis*.

The shells of these snails are, of course, very abundant, and lie half hidden beneath grass, mosses, and plants. The bees, finding them in such situations, dispense with their accustomed labour, and take possession of the deserted shells. The number of cells varies according to the length of the whorl of the shells selected, the usual number being four; but in some instances they construct five or six, commencing at the end of the whorl. A suitable supply of pollen and honey is collected, an egg deposited, and a partition formed of abraded vegetable matter. The process is repeated until the requisite number is formed, when the whole is most carefully protected by closing up the entrance with small pellets of clay, sticks, and pebbles; these are firmly cemented together with some glutinous matter, and the bee has finished her task." When she has selected the shell of a much larger snail, say that of *Helix aspersa*, in which the whorl is much larger in diameter than that of the other two—in fact, too wide for a single cell—"our little architect, never at a loss, readily adapts it to her purpose by forming two cells side by side; and as she advances towards the entrance of the whorl it becomes too wide even for this contrivance. Here let us admire the ingenuity of the little creature. She constructs a couple of cells transversely! And this is the little animal which has been so blindly slandered as being a mere machine."

The Leaf-cutter Bee (Megachile centuncularis) is a well-known British species. It is peculiarly fond of the leaves of rose bushes, which may often be seen with circular pieces cut out of them. The bee places itself on the edge of the leaf, so that it passes between its legs, and with its great and sharp mandibles it cuts out a piece quickly, poisoning itself on its wings when it has nearly finished its work, so that it may not tear the piece, and to keep it and the cutter from falling to the ground. When it has quite detached the piece it holds it firmly between its legs, and carries it to its nest, where it uses it with similarly formed pieces to build its cell. It takes many pieces of leaf to form one cell. As soon as one of these is completed the bee collects honey and pollen, which she places at the bottom, and on this provender, provided for its young, she deposits an egg. She covers the shell with pieces of leaf, so cut as to fit it exactly, and then commences to form another similar cell above it. This bee usually makes its nest in holes in decayed wood, though it also constructs them in holes in walls and in pathways. *Xylocopa violacea* (the Carpenter Wood-cutter Bee) is a large species, with wings of a deep violet colour. In the beginning of spring she fixes upon a suitable piece of wood, and with her strong mandibles begins the process of boring. First proceeding obliquely downwards, she soon points her course in a direction parallel with the sides of the wood, and at length forms a cylindrical hole not less than 12 or 15 inches long and half an inch broad. In excavating her tunnel she has detached a large quantity of fibres, which lie on the ground like a heap of sawdust. Having deposited an egg at the bottom of the hole along with the requisite store of pollen and honey, she next, at the height of about three-quarters of an inch, constructs a ring of particles of the sawdust glued together. The interior edge of this affords support for a second ring of the same materials, and thus the ceiling is gradually formed of these concentric circles. One cell being finished, she proceeds to another, and so on until she has divided her whole tunnel into ten or twelve apartments. *Anthidium manicatum* has the abdomen spotted on the side with yellow, and in the male it is inflexed at the end and armed with five spines. Its nest is constructed in any hole it finds adapted for its purpose. The chamber being found, "the bee collects a quantity of down from woolly-stemmed plants, with which she forms an outer coating. She then constructs a number of cells for the reception of the pollen or food of the larva. They consist of a woolly

material mixed with some glutinous matter, which resists the moisture of the food it contains, and in which the larva, on being full fed, spins a brown silken cocoon." The sexes differ from most other bees in the males being much larger than the females. There are four British species of the genus *Anthophora*, which is one of great extent, and distributed over the whole world. *Anthophora cervorum* is found in all parts of the United Kingdom. It literally swarms in some places. In the south of the Isle of Wight the cliffs are often completely riddled with their burrows.

Genus Bombus (Humble Bee).—Bees of this genus may be at once known by their very large and hairy bodies. In Hampshire they are called "dumblers," while in other districts they are named "bumble bees" and "hummer bees." The name "humble" may be a corruption of "humming bee," from the loud hum so characteristic of the species. In Scotland they are called "bumbees," while the brown species are called "foggies." A few females, having passed the winter in a torpid condition, revive with the return of spring, and become each the foundress of a separate colony. Their first nests are only large enough to contain a few cells, in which they rear the workers who assist them in the formation of the works necessary to the wants of a large colony. When the larvae are full grown they spin a tough oval silk cocoon, in which they assume the nymph state; and, when sufficiently advanced towards maturity to require food, they begin to gnaw off the crown of their imprisoning chamber, in doing which they are assisted materially by the workers. On first emerging from their confinement they are by no means matured. Their pubescence is of a uniform pale colour, and some days elapse before they acquire the gay livery which they have assumed ere they fly.

The numbers of which the societies of humble bees consist vary greatly in different species. Mr. F. Smith states that in a nest of *Bombus fragrans*, a species met with in the north, five females and about twenty workers were taken, so that it is a species with a small community. The nest of *Bombus terrestris*, taken in August, contained thirty-five females, twenty males, and one hundred and sixty workers; but by this time the majority of the males and females had left the nest. There were found in this nest, besides, two females of *Apathus vestalis*, and nine of the males of that parasite.

The species called "moss-builders" often compose their nests of nothing but grass and leaves, although in situations where moss is abundant they use it in the construction of their habitations. To show that these diligent hairy creatures make use of such materials as come most readily to them, an interesting instance has been recorded:—"One of the brown species of humble bees was observed frequently flying into a stable through the latticed window. The bee was busily engaged in collecting bundles of short horse-hair accumulated from the currying of horses. This she fled off with to a short distance, and settled down with it among some grass. On examining the spot a nest composed entirely of horse-hair was discovered." The moss-builders among the humble bees appear to have very little pugnacity, as they show no courage in the defence of their citadel, while the underground nest-builders defend their homes with great boldness.

The humble bees have a parasitic genus of bees, which live in their nests. They form a separate genus called *Apathus*. They live on the most friendly terms with the industrious part of the community. It has been supposed, from the very close resemblance of the *Apathi* to the *Bombi*, that the former are an idle race, reared at the expense of the industrious bees, and wearing a livery in imitation of them for the purpose of deception; but a yellow-banded bee, *Apathus barbutellus*, is found in the nest of *Bombus Derhamellus*, a black species with the tip of the body red.

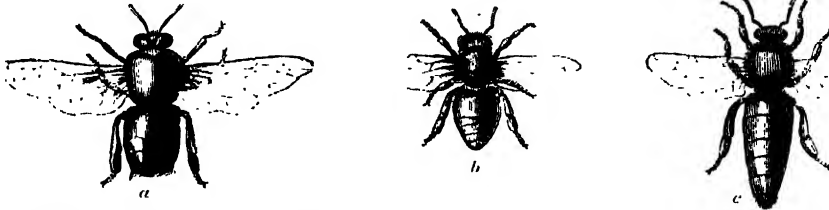
The genus *Apathus* differs from *Bombus* in the structure

of the hind legs, which have no "pollen-baskets." There are only males and females of the Apathi.

Mr. Darwin believes, from observations made over a series of years, that humble bees are indispensable to the fertilization of the heart's-ease (*Viola tricolor*), as it is the only set of bees which visit that flower. He has tried experiments which convince him that the visits of bees are, if not indispensable, at least highly beneficial to the fertilization of our clovers. He has observed that humble bees alone visit the common red clover (*Trifolium pratense*), as other bees cannot reach the nectar. He adds—"Hence I have very little doubt that if the whole genus of humble bees

became extinct or very rare in England, the heart's-ease and red clover would become very rare, or wholly disappear."

The *Hive Bee* (*Apis mellifica*) is gregarious, and numbers co-operate in the construction of a hive, and in all the labours of a well-ordered state of society. In its natural state this species chooses the hollows of trees, of rocks, or of buildings, for its domicile; but it may be regarded as a semidomesticated insect, of whose labours man avails himself, and to whom it is a sort of property. A colony of bees is termed a swarm or a hive, and consists of three sorts, viz. males or drones, neuters or workers, and the queen or reigning female.



a, The Male or Drone; b, Neuter or Worker; c, the Female or Queen. (The lines denote the natural length of each.)

The drone or male is almost cylindrical in form, and has the division between the thorax and abdomen much less distinct than in the female or the neuters; the eyes are large; the antennae thirteen-jointed; the wings large; the legs black; no sting.

The neuters or workers have their abdomen conical and composed of six segments; the hind legs are transversely striated on the inner side. The wings, when closed, nearly reach to the apex of the abdomen. Sting straight.

The female or queen bee is dark coloured; head hairy; antennae twelve-jointed; thorax hairy; abdomen elongated; legs brownish-yellow; wings short; sting bent.

A hive of bees, besides males, workers, and queen, consists also of eggs and larvae, destined to form a future brood. The number of workers in a well-stocked hive varies from 15,000 to 20,000. The number of males or drones is irregular; sometimes they amount to 1000, sometimes only to 600 or 700. It is on the neuters that all labour devolves; and, strange to say, these neuters are really undeveloped females. To what, it may be asked, is this difference between the neuters and the queen to be attributed? To a mode of management which we can scarcely appreciate. If the wax-combs of a bee-hive be examined it will be found that the cells containing the larvae are of three sorts. Those built for the males or drones are larger than those intended for the workers or sterile females, while those intended for the future queens of different broods, generally three or four in number, and termed royal cells, are still larger, and shaped somewhat like a Florence flask. The honey-cells differ but little from those of the workers, but are generally deeper, the rims being more raised. The difference in the size of the cells, and in the nature and quality of the food with which the female larvae are nourished, conduces, in the one instance, to the production of a few large and fertile queens, and in the other to that of the ordinary workers. It has been demonstrated that if bees be deprived of their queen, and have combs containing only the young of the working brood, they will select one of those larvae not more than three days old from the egg, and proceed to enlarge and alter its domicile, by breaking down the adjacent cells and emptying their contents, whether honey or larvae. They build up, in short, a royal cell around the object of their choice, giving the cradle a vertical instead of horizontal direction, and nourishing the larva with peculiar diet.

In three days, the larva being two days old when selected, it begins to surround itself with a cocoon of silk, and afterwards assumes the pupa state. The workers now shut up the cell with wax, as they do those of the pupae of drones and workers. In a few days the pupa is hatched, and the queen comes forth among her devoted subjects. Sixteen days is the period assigned for the preparatory stages of a queen bee, viz. egg, three days; a feeding larva, five days; not feeding but spinning its cocoon, one day; still and quiet, two days and sixteen hours; pupa, four days and eight hours; total, sixteen days. The workers require twenty days, the males twenty-four.

"The queen bee, before impregnation, lays eggs which produce males only. After impregnation, which takes place but once only in the course of her lifetime, the eggs produce male or female larvae according to the sort of cells in which they are laid. By a delicate and difficult microscopical examination, Siebold has proved that the eggs laid in the queen's and workers' cells have been penetrated by one or more zoosperms, which, on the other hand, are never found in the eggs deposited in drone cells. He concludes, with reason, that the access of the impregnating fluid contained in the receptacle is cut off at pleasure by an instinctive act of the female in oviposition. The worker bees, or females with undeveloped organs, being incapable of impregnation, in the rare cases in which their ovaries are sufficiently developed to mature a few eggs, these produce only male brood." (Haliday.)

The queen bee is the most important personage in the hive, and bears no rival. There are several royal pupae in each hive, but they are in danger; for the first hatched queen would, if not prevented, destroy them; and when two queens appear at the same time they engage in mortal conflict, and one falls a sacrifice.

Three or four swarms generally issue from the same hive, each headed by its queen. The first swarm is conducted by the old reigning queen, who, previously to her departure, has at separate intervals laid female eggs in the royal cells. Of these the first-born is usually the occupier of the vacant throne, and in turn leads off another swarm. The longest interval between the swarms is from seven to nine days, which is usually the space that intervenes between the first and second; the third flies sooner, and the last sometimes departs the day after the third. Fifteen or eighteen days are generally sufficient for throwing the

four swarms. For some days before swarming takes place the bees appear to be greatly excited, and the temperature of the hive rises from 92° to 104°. The old queen, when she takes flight with the first swarm, leaves plenty of brood in the cells, which soon renew the population.

"There is," say Kirby and Spence, "something singular in the mode in which the workers treat the young queens that are to lead the successive swarms. After the cells of the pupæ are covered in, one of their first employments is to remove her and there a portion of wax from their surface, so as to render it unequal; and immediately before the last metamorphosis takes place the walls are so thin that all the motions of the inclosed pupa are perceptible through them: on the seventh day the part covering the head and trunk of the young female is almost entirely unwaxed." The reason of this procedure is evident. Were the new queen to leave her cell at the usual period, which she would do were she to pursue her own inclinations, she would immediately attack and destroy those in the other royal cells; and though this is permitted when a successor to a dead or lost queen only is wanted, it is prevented when the successive leaders of swarms are required. Hence, when the workers perceive that the young queen has cut through her cocoon, they imprison her for two days against her own will, and, after feeding the murmurer with honey, bar her egress with a door of wax. Were a queen destined to lead a swarm permitted to leave her cell as soon as the natural term arrived, she would prove a source of much trouble; it would require some time to fit her for flight, and in the meantime she would require constant watching and constraint, in order to prevent her destroying the larvæ or pupæ of the succeeding queens. It is easier to imprison than restrain her, and hence she is detained in her cocoon till ready to head the swarm. The oldest is of course first treated in this manner; then the next, and so on, until the queen of the last swarm departs with her retainers; the remaining queens, the hive being now sufficiently thinned, fight unimpeded till one gains the throne. It sometimes happens that, when the original queen and her swarm are prevented from migrating by bad weather, she destroys the young brood in the royal cells, so that, when she leaves, the workers who remain are obliged to educate a worker larva into a queen. Generally, however, some of the royal brood escape her vengeance, a favourable change in the weather inducing her to depart.

When the larvæ in royal cells are about to change into pupæ, the old queen begins to exhibit signs of agitation, running carelessly over the cells and occasionally thrusting her abdomen into some of them, as if about to lay, but withdrawing without having done so, or perhaps depositing the eggs on the side of the cells instead of at the bottom. She is no longer surrounded by her usual circle of attendants, and, her agitation being communicated to all she passes, a general confusion is at length created, till at last the greater portion of the bees rush out of the hive with this queen at their head. It is thus that the first swarm quits the hive, and it is invariably conducted by the old queen. At any other time she would have been unable to fly, from the weight of the great number of eggs contained in her abdomen, but after the great laying she is sufficiently reduced to fly with ease. An unerring instinct obliges the queen to leave the hive at this time, for two sovereigns never can coexist in the same community; and had she not left it, the young queens, just now about to quit their cells, would inevitably have been killed by her.

The departure of the swarm reduces the hive. It must, however, be borne in mind that the event seldom occurs excepting about the middle of the day and during fine sunny weather, when a large portion of the bees are abroad gathering honey and pollen; and if the hive contain a numerous colony, these, on their return, together with those which have not been disturbed during the general confusion,

and a considerable number of young brood continually hatching, form a sufficient stock, and perhaps enough to send off another swarm.

In two or three days' time from the departure of the first swarm perfect order is restored in the hive, and the nurse bees continue to attend on the young, carefully watching the queen's cells, and working at the outside by removing the wax from the surface. It is said that the wax is removed in order to facilitate the exit of the young queen, but this is doubtful. When a swarm quits a hive it generally clusters on a tree or bush in the neighbourhood, and, if not soon secured, takes flight in search of some convenient abode.

With respect to the neuters or workers, they form two sets, viz. small nurse bees, which watch and nurse the young and attend to the cells in which they lodge; these are also called sculpturers; secondly, larger wax-workers, the out-of-door labourers, the collectors of honey and the wax to be moulded by the former. The sole occupation of the female is in depositing her store of eggs, at the rate perhaps of 200 per day, or 12,000 in two months. The egg of the bee is about the twelfth of an inch long, and cylindrical in form, with rounded ends. When the larva emerges from the egg it is immediately supplied with food by the nurse bees. It is at first curved up, and lies at the bottom of the cell, where it continues to grow till it has completely filled up the space, lying horizontally, with its head at the mouth of the cell. The food of the larvæ consists of a mixture of pollen and honey, converted into a whitish "chyle" by elaboration in the stomachs of the nurse bees. The proportions of pollen and honey vary according to the age of the young. It would seem that at first the food is not given directly to the larva, but disgorged into the cell, so that the larva is surrounded with it. But when the larva is nearly full-grown its food is sweeter, and is applied by the nurse bees to its mouth, somewhat in the manner of a bird feeding its young.

As regards the males, or drones, the purpose of their existence accomplished, they are doomed to death. Produced in April or May, they live till July or August, when the workers commence a general massacre which continues for two or three days. The motive which incites the worker bees to this entire destruction of the males has often been discussed, but is not understood, for it appears that in hives deprived of a queen they remain unmolested, and also in those rare cases in which the female (her pairing being retarded beyond the twenty-eighth day of her existence) lays only male eggs, and is useless. Dr. Romanes ("Animal Intelligence," 1882) says—"Evidently the object of this massacre is that of getting rid of useless mouths; but there is a more difficult question as to why these useless mouths ever came into existence. It has been suggested that the enormous disproportion between the present number of males and the single fertile female refers to a time before the social instincts became so complex or consolidated, and when, therefore, bees lived in lesser communities. Probably this is the explanation, although I think we might still have expected that before this period in their evolution had arrived bees might have developed a compensatory instinct, either not to allow the queen to lay so many drone eggs, or else to massacre the drones while still in the larval state. But here we must remember that among the wasps the males do work (chiefly domestic work, for which they are fed by their foraging sisters); so it is possible that in the hive bee the drones were originally useful members of the community, and that they have lost their primitively useful instincts. But whatever the explanation, it is very curious that here, among the animals which are justly regarded as exhibiting the highest perfection of instinct, we meet with perhaps the most flagrant instance in the animal kingdom of instinct unperfected."

To the labours of the workers are due various products,

as *honey*, *bee-bread*, *wax*, and *propolis*. Honey is the nectar of flowers conveyed in the "crop" or honey-bag. Here it undergoes but little alteration (for honey extracted from some plants is poisonous), and is disgorged into the cells destined to receive it. Of these some are store-cells; others are filled for daily use. A single cell will contain the contents of many honey-bags; and though the cell is horizontal the honey will not escape, for a thick cream arises and forms a glutinous film obliquely placed, keeping in the treasure. The store-cells when filled are covered with a waxed lid. While the bee is extracting the sweets of the flowers it becomes covered with the pollen of the anthers; this pollen it wipes off from its body with the brushes of its legs, collects every particle together, and kneads it into two little masses, which are each placed in a sort of basket on the broad surface of the tibia or middle joint of the leg, where a fringe of elastic hair overarches a concavity, and acts as a sort of lid or covering. Thus burdened, off the insect flies to the hive; first the honey is safely lodged, then the bee-bread or kneaded pollen is disposed of as circumstances may require. Sometimes it is eaten by several bees, called by a peculiar sort of hum to their repast; and if more is collected than required for present use it is deposited in some of the empty cells as a future provision. Wax is a peculiar secretion in little pouches or cells beneath the scales of the abdomen. Of these pouches there are generally four on each side, at the base of each intermediate segment on the under surface, and concealed by the overlapping of the preceding segment. It would appear that, by some internal process, wax is elaborated from honey, as the wax-workers retain the honey when wax is required, which they would otherwise disgorge into the cells. The wax oozes out between the abdominal rings in the form of little scales. Propolis is a resinous matter collected from the buds of various trees. The bees procure this resin by means of their mouth—prepare it, load each hind leg with it, and so carry it to the hive. It is employed not only in varnishing the cells, but in stopping up crevices, for coating the sticks which support the combs, and for mixing with wax and patching up weak parts. Often it is spread interiorly over the dome of the hive, and it is mixed up with the wax forming the cells.

Such, then, are the products of the field labours of the nectar bees. A bee-hive, with its waxen furniture, is a wonderful piece of work. It contains a series of vertical plates, having closely arranged hexagonal cells, with pyramidal bases, composed of three rhomboid pieces horizontally directed on each side. The use of these cells is threefold—they serve as receptacles for the eggs and larvae, as magazines of honey, and as store-houses for bee-bread.

The construction of a comb is among the wonders of instinctive skill. To work in circles or segments of circles appears to be most compatible with animal mechanism impelled to the task by instinct. The cells of almost all the various species of bees are circular; and we find that, under peculiar circumstances, those of the hive bee are so likewise, as in the case of the royal cell and some of the cells close to it, and sometimes in other parts of the comb, in cases where an accident has been repaired. If we suppose some hive bees set to work in a solid plate of wax, the first cell formed would most probably be cylindrical, with a thimble-like bottom. This would be the form of the following cells, unless they came in contact with each other; and in this case, supposing the circumference of three cylinders were to touch, the bees working at these cylinders would cut away the wax so as to fit them together angularly, supposing that the plate-block of wax were excavated on one of its sides into the greatest number of equal-sized cylinders that it would admit of. It would follow that each cylinder would then be surrounded by six others, this being the only number of equal-sized circles which may be placed in contact round one of the same

magnitude. Remove the superfluous wax from the walls and these cylinders become hexagons.

The first operation in the building of the comb is the deposition of wax. For this purpose the wax-workers suspend themselves in festoons from the top of the hive, and the outline of the festoon is soon filled up by a crowd of workers. Now begins the operation. One or more of the topmost bees, settling on the roof of the hive and clearing a space, detaches one of the wax scales from the abdomen by means of its hinder legs, and conveys it by means of the fore legs to the mouth, where it is masticated and impregnated by a frothy liquid from the tongue, in which process it obtains a whiteness and opacity it did not before possess. Thus prepared, the particles are applied to the chosen spot, when, having finished, it is followed by another bee, and so on by others in succession, all adding to the breadth and length of the vertical plate. As the wax-workers deposit the wax, so do the sculpturers succeed them and excavate the cells. There seems to be an instinctive desire to perform the work of excavation wherever there is room, even though there may not be sufficient material to form a perfect cell, for we never observe a solid piece of wax in any part of a comb; but if by accident there has been a space unoccupied by cells, we find that the wax has been excavated at that part as much as possible. It is to this instinctive desire of performing the work of excavation that we may attribute the small pits about the royal cells, which are said to be for the purpose of facilitating the exit of the young queens. But it is not confined to that part through which they make their escape. The cells are indeed made thin, but, as we have said, the exit of the young queen is often impeded. In forming the cells a hollow is first excavated on one side of the wax block; this excavation is rather less than the width of a cell, and is immediately followed by two of a similar description on the opposite side of the block. The particles of wax removed are kneaded by the jaws of the bee and deposited on the edges of the intended cells. In carrying up the walls the form is regulated by the juxtaposition of the original circles, or their impingement on each other; hence the necessity of the hexagonal mode of adaptation. In the construction of the cells we meet with the highest perfection of instinct. On this point Dr. Reid makes the following statement:—"There are only three possible figures of the cells which can make them all equal and similar, without any useless interstices. These are the equilateral triangle, the square, and the regular hexagon. Mathematicians know that there is not a fourth way possible in which a plane may be cut into little spaces that shall be equal, similar, and regular without useless spaces. Of the three figures the hexagon is the most proper for convenience and strength. Bees, as if they knew this, make their cells regular hexagons. Again, it has been demonstrated that by making the bottoms of the cells to consist of three planes meeting in a point, there is a saving of material and labour in no way inconsiderable. The bees, as if acquainted with these principles of solid geometry, follow them most accurately. It is a curious mathematical problem at what precise angle the three planes which compose the bottom of a cell ought to meet in order to make the greatest possible saving, or the least expense of material and labour. This is one of the problems which belong to the higher parts of mathematics. . . . Maclaurin has determined precisely the angle required, and he found, by the most exact mensuration the subject would admit, that it is the very angle in which the three planes in the bottom of the cell of a honey-comb do actually meet." Darwin, in his "*Origin of Species*" (sixth edition, p. 220), offers the following explanation:—"Let us look to the great principle of gradation, and see whether nature does not reveal to us her method of work. At one end of a short series we have humble bees, which use their old cocoons to hold honey, sometimes adding to them short

tubes of wax, and likewise making separate and very irregular rounded cells of wax. At the other end of the series we have the cells of the hive bee, placed in a double layer. . . . In the series between the extreme perfection of the cells of the hive bee and the simplicity of those of the humble bee, we have the cells of the Mexican *Melipona domestica*. . . . It forms a nearly regular waxen comb of cylindrical cells, in which the young are hatched, and, in addition, some large cells of wax for holding honey. These latter cells are nearly spherical and of nearly equal sizes, and are aggregated into an irregular mass. But the important point to notice is, that these cells are always made at that degree of nearness to each other that they would have intersected or broken into each other if the spheres had been completed; but this is never permitted, the bees building perfectly flat walls of wax between the spheres which thus tend to intersect. Hence, each cell consists of an outer spherical portion, and of two, three, or more flat surfaces, according as the cell adjoins two, three, or more other cells. When one cell comes into contact with three other cells, which from the spheres being nearly of the same size is very frequently and necessarily the case, the three flat surfaces are united into a pyramid; and this pyramid, as Huber has remarked, is manifestly a gross imitation of the three-sided pyramidal basis of the cell of the hive bee. . . . Reflecting on this case, it occurred to me that if the *Melipona* had made its spheres at some given distance from each other, and had made them of equal sizes and had arranged them symmetrically in a double layer, the resulting structure would probably have been as perfect as the comb of the hive bee. . . . Hence we may safely conclude that, if we could slightly modify the instincts already possessed by the *Melipona*, and in themselves not very wonderful, this bee would make a structure as wonderfully perfect as that of the hive bee. We must suppose the *Melipona* to have the power of forming her cells truly spherical, and of equal sizes; and this would not be very surprising, seeing that she already does so to a certain extent, and seeing what perfectly cylindrical burrows many insects make in wood, apparently by turning round on a fixed point. We must suppose the *Melipona* to arrange her cells in level layers, as she already does her cylindrical cells; and we must further suppose, and this is the greatest difficulty, that she can somehow judge accurately at what distance to stand from her fellow-labourers when several are making their spheres; but she is already so far enabled to judge of distance, that she always describes her spheres so as to intersect to a certain extent; and then she unites the points of intersection by perfectly flat surfaces. By such modifications of instincts in themselves not very wonderful (hardly more wonderful than those which guide a bird to make its nest), I believe that the hive bee has acquired, through natural selection, her inimitable architectural powers."

The ordinary cells of a comb are of two sizes; those designed for the male larvæ being rather larger than those of the ordinary size in which the neuter larvæ are reared. A comb is always commenced with the small-sized cells; hence, when the larger cells are constructed, instead of each being opposed to three others, it encroaches upon a fourth, and its base is consequently composed of four plates instead of three; and indeed from this cause, and during the progress of the comb in building, from various accidental circumstances the uniformity of the comb may be more or less interrupted.

Bees have many enemies. Besides hornets and wasps, which invade the hive, certain species of moth are very troublesome. The death's-head hawk-moth (*Acherontia atropos*), a large species, sometimes makes its way into hives and consumes the bees' stores. This insect has the power of emitting a peculiar sound, not unlike that of the queen bee; and this sound is supposed to have the same

effect—that of rendering the workers motionless—as the peculiar signal-notes which she utters. Two other moths, small species, commit great devastation in hives; one is the honey moth and the other the honeycomb moth (*Achroia alcearia* and *Galleria mellonella*). These moths, in spite of the guards kept constantly at the entrance of hives, gain admittance and deposit their eggs in the combs. The larvæ hatched from these eggs form passages through the comb in all directions, spinning a silken tube as they proceed which is too strong for the bees to destroy, and of course they cannot sting the larvæ. These larvæ generally oblige the bees to desert the hive after a short time.

Dr. Romanes, in "Animal Intelligence," has devoted a considerable amount of space to bees, proving that they are not governed altogether by instinct, but that they possess the power of reasoning. With regard to their sense of direction, Sir J. Lubbock observes—"I never found bees to return if brought any considerable distance at once. By taking them, however, some 20 yards each time they came to the honey, I at length trained them to come to my room." This power of noting objects and remembering them is put to the severest test in the case of locomotive hives. In some countries, as Egypt, it is the practice to transport the apiaries to distant places, in order to take advantage of the succession of flowers. In Lower Egypt, for example, about the end of October the bee-keepers embark on the Nile, and migrate with them into Upper Egypt, calculating to arrive there when the inundation is rapidly subsiding, and the flowers are beginning to bloom. Having stayed a short time in one place, till they suppose that the bees have collected all the honey and wax of the district, they remove two or three leagues lower down, and so on as the plants come into bloom. Thus gradually returning homewards, they collect the honey of the adjacent country, and about the beginning of February, having travelled the whole length of Egypt, arrive at the spots whence they had set out, and return to their habitations. Emery, in *Nature* (vol. xii.), mentions, as an instance of their powers of communication, the way in which the bee-hunters of America find a bees' nest:—"Going to a field or wood at a distance from tame bees, with their box of honey, they gather up from the flowers and imprison one or more bees, and after they have become sufficiently gorged, let them out to return to their home with their easily gotten load. Waiting patiently a longer or shorter time, according to the distance of the bee-tree, the hunter scarcely ever fails to see the bee or bees return accompanied with other bees, which are in like manner imprisoned till they in turn are filled, when one or more are let out at places distant from each other, and the direction in each case in which the bee flies noted; and thus, by a kind of triangulation, the position of the bee-tree proximately ascertained." Sir J. Lubbock has no high opinion of their social sympathies:—"Far indeed from having been able to discover any evidence of affection among them, they appear to be thoroughly callous and utterly indifferent to one another."

Erroneous impressions are entertained by many with reference to the titles of owners of bees to the swarms which in their season leave the parent hive. Many have got into difficulties by laying claims to swarms which had flown to a distance from the original hive. But the laws relating to property in bees are clearly defined in the United Kingdom. In a wild state they are held to be common property, but when hived they belong to the occupier of the land on which they are found; and when they swarm the new broods are regarded as the property of the owner of the old hive so long as he can follow them, and thus prove their identity.

BEECH (*Fagus*) is a genus of trees belonging to the same order as the oak—the *CUPULIFERÆ*. In this genus the male flowers are gathered three or four together in drooping heads—each flower consisting of from eight to

twelve stamens surrounded by a bell-shaped calyx of five or six divisions. Each female flower consists of a calyx inclosing a three-celled ovary, with two ovules in each cell; and these flowers, three or four together, are surrounded by an involucre, which gradually grows into the well-known cupule with its three or four nuts. Of the six ovules in the ovary only one comes to perfection as the seed in the ripe nut.

Various kinds of beech are found in Europe, North Asia, Australia, North America, and temperate South America. Altogether there are fifteen species, some of which are mere bushes; the only one in Europe of any importance is the *Fagus sylvatica*, or common beech, a native of various parts of the world in temperate climates. It is one of the most handsome of our trees on dry sandy or chalky situations; its nuts or mits not only furnish food for swine, but yield by pressure, after pounding, a useful oil; and its timber, although not of good quality where strength and durability are required, is extensively used for a variety of purposes, particularly for boatbuilding, work under water, carving, and chairmaking; it is also one of the best kinds of wood for fuel. The fern-leaved (*Fagus sylvatica asplenifolia*), the cut-leaved (*heterophylla*), and the crested variety (*cris-tata*) are the more ornamental of the upright-growing forms of beech. The purple form (*purpurea*) is the greatest favourite, and it grows luxuriantly in almost any description of soil. The weeping forms are of value in pleasure-grounds as a contrast with other trees of different outline.

Leaves of the beech occur in rocks of the Cretaceous period in North America, in the Eocene in England and other parts of the globe.

BEECH'Y, SIR WILLIAM, R.A., one of the most successful of the English portrait painters, was born at Burford in Oxfordshire, in 1753, and was originally articled to a conveyancer at Stow. But having a strong love for painting, he determined to pursue it as a profession, and he obtained admission into the Royal Academy in 1772. Mr. Beechey early distinguished himself, and was elected an Associate of the Royal Academy in 1793, and was appointed in the same year portrait painter to the queen, of whom he painted a whole length. In 1798 he executed his principal work, a large equestrian picture of George III., the Prince of Wales, and the Duke of York, attended by Generals Dundas, Sir W. Fawcett, and Golds worthy, reviewing the 3rd and 10th Dragoons; for which he was elected a Royal Academician and knighted by the king, being the second artist upon whom George III. conferred that honour. He died in January, 1839.

BEECH'WORTH, an important and flourishing township in Victoria, Australia, is the capital of the shire of Beechworth, 180 miles (171½ by rail) N.E. of Melbourne, and about 25 miles S. from the Murray River. It is the principal town of the Murray district and of the celebrated Ovens gold-fields. It is situated on high land, being 1775 feet above the sea-level. The town possesses numerous business premises of considerable pretensions, and has also many public buildings, of which the town-hall, the churches belonging to the Church of England, Roman Catholic, Presbyterian, Wesleyan, and Independent denominations, the Athenaeum, the state schools, and the hospital, benevolent and lunatic asylums, freemasons' hall, and court-house, are the most prominent. The chief banks of Victoria have branches, and the principal insurance companies agencies in Beechworth. The public library and Burke Museum is the best out of Melbourne. The district is essentially a mining one, formerly alluvial, but now much more of the reef character, and likely therefore to be permanent. Alluvial mining is, however, still carried on. The water supply is derived from Lake Kerferd, which has become a favourite pleasure resort of the inhabitants of Beechworth and Stanley. The population of Beechworth in 1883 was 3000; of the shire, 8000.

BEE-EATERS (Meropidae), a family of birds belonging to the order VOLUCRIFORMES, are composed of the two genera *Merops* and *Nyctiorhis*. The birds of this family are very swift, and feed on bees, wasps, and other insects, when on the wing. They have an elongated and more or less curved bill, of which the gape extends backwards beneath the eyes; their nostrils are partly concealed by short bristles; their wings are long and pointed, indicating considerable powers of flight; and they have a long and broad, usually more or less wedge-shaped tail, of which the two middle feathers are generally a good deal longer than the rest. These brilliantly coloured birds are all inhabitants of the Old World, being found in Southern and Eastern Europe, in Asia, and throughout Africa.

The Common Bee-eater (*Merops apiaster*) visits the south of Europe regularly as a summer bird of passage, and is seen, though rarely, in the British Isles. It is about



The Common Bee-eater (*Merops apiaster*).

11 inches long. The whole of the under surface and the wings are green, the upper surface is reddish brown, the throat saffron, and the bill black.

From the earliest time this beautiful bird has been noted for the destruction it produces among the bees. It is doubtless the *Merops* of Virgil ("Georg." lib. iv.) In reference to the power possessed by the bee-eater, and indeed by many other small birds, of swallowing bees and wasps with impunity, Yurrell says—"I believe that the bird pinches the insect, passing it from head to tail between the points of its mandibles till, by repeated compression, particularly on the abdomen, the sting is either squeezed out or its muscular attachments so damaged that the sting itself is harmless."

The bee-eater breeds in a hole, which it excavates in the bank of a river to the depth of about 6 inches, and lines with soft moss for the reception of its eggs. It is gregarious in the breeding season, as at other times; and in Southern Russia, particularly about the rivers Don and Volga, where the birds are very abundant, they dig into the clay banks of the rivers in such numbers, and so close together, that the banks almost resemble a honeycomb. The eggs are from five to seven in number, and of a pure white colour.

The Australian Bee-eater (*Merops ornatus*) is the only species inhabiting Australia. Wallace met with it in Lombok, an island in the Malay Archipelago. "This elegant little bird," he says, "sits on twigs in open places, gazing eagerly around, and darting off at intervals to seize some insect which it sees flying near; returning afterwards to the same twig to swallow it. Its long, sharp, curved bill, the two long narrow feathers in its tail, its beautiful green plumage, varied with rich brown and black and vivid blue on the throat, render it one of the most graceful and interesting objects a naturalist can see for the first time."

The genus *Nyctiorhis* is represented by the azure-throated bee-eater (*Nyctiorhis albertoni*). This little bird inhabits the deepest recesses of the forests of India. Its food consists of bees, beetles, and other insects.

BEEF-EATER, a jocular appellation now used for the yeomen of the guard. A very probable derivation is from *buffetier*, a name supposed to have been given to such of that body as waited at table on great occasions, and were ranged near the *buffets*, which were either cupboards or sideboards furnished for the service of the table.

BEEF-EATER (*Buphaga africana*), sometimes called Ox-pecker, is a bird belonging to the order PASSERES, common in many of the warmer parts of Africa, where it follows the singular mode of life from which it has obtained its name. Perching upon the backs of oxen and other cattle, it sets to work busily to extract from their skins the larvae of the bot-flies, with which they are almost constantly infested, and which often give rise to painful tumours; it creeps about in all directions upon the body of the ox by means of its powerful feet, which exhibit some resemblance to those of a wood-pecker, although the toes are in the ordinary position. The bill of the bird is well adapted for digging and squeezing out the larvae; it is short and stout, and inflated towards the extremity. The cattle are said to submit with exemplary patience to the operations of the bird, as if aware of the benefit to be derived from them. It performs a like service for the rhinoceros, and in addition gives him warning by its shrill notes when danger is nigh. The beef-eater is a small bird, measuring between 8 and 9 inches in length; its plumage is reddish-brown above, and pale tawny beneath, with the belly nearly white; the bill is yellow at the base, and coral red at the extremity. It lives in small bands, consisting of seven or eight individuals, and is very shy.

Another species, *Buphaga erythrorhyncha*, is a native of the island of Madagascar, and also of the regions of



Buphaga erythrorhyncha.

Northern Africa. It is distinguished from the former species by the smaller size of its bill, and the red colour of that organ. It is also about a third less in general size, measuring only 7 inches in length; and the tints of its plumage are more sombre.

BEE-FLY. See BOMBYLIDÆ.

BEEF-TEA, an article of diet chiefly used by invalids, on account of its easy digestion and nutritious qualities. It is made by lean beef, first cut into small pieces, being placed in cold water, in the proportion of a pound to a pint, and allowed to simmer over a slow fire, thus extracting the savoury juices of the meat. If, after being prepared in this way, the meat be reduced to powder and a portion mixed with the liquor, the assimilation of the tea itself

will be greatly assisted. Tea or broth made in a similar way from a young chicken is also very nutritious and easy of digestion, but that made from mutton or veal is not so suitable for invalids, especially where there is great weakness or irritation of the stomach.

BEEFWOOD. See CASUARINA.

BEE-LOUSE (*Braulta caeca*) is a minute insect allied to the FOREST-FLY, belonging to the order DIPTERA. It is a parasite on the Italian bee (*Apis ligustica*), and has been found in this country. Eyes, both simple and compound, are wanting.

BEELZEBUB. The name of the supreme god among all the Syro-Phœnician peoples was BAAL (meaning lord or owner), and by adding to it *zebub*, or insect, the proper name Baalzebub was formed, the god of Ekron, according to 2 Kings i. 2; the fly-god, the averter of insects, he having the supposed power of driving away noxious flies. In the New Testament the word is applied to Satan, the ruler or prince of demons. But the best Greek MSS. read Beelzebui in the Gospels, an orthography followed by the latest critical editions. The reason why the name of Beelzebub was applied to Satan at the time of Christ is obscure.

BEER and **BREWING.** Under the article ALE a few historical facts have been mentioned regarding that beverage, and in this place it is intended to deal with the subject in a more comprehensive manner. The word beer is a generic term, under which there are embraced a number of intoxicating drinks which are produced, in most cases, by the fermentation of an aqueous infusion or decoction obtained from barley in the form of malt. There are, more especially, the liquors known as ale, beer, porter, and stout; and others are known in foreign countries under a variety of names, and are made in a primitive way by semi-civilized tribes, or they are regular articles of manufacture in industrial communities. In addition to barley there have been, or are still, employed such cereal grains as wheat, rice, oats, maize, &c., as the foundation material in the manufacture of beer; and the seeds of other plants of the grass family (*Graminææ*), such as the millet or durra, and the *Poa* or meadow grass, have also been used for the same purpose. Portions of certain other vegetables and products of plant life may likewise serve as the starting-point in the manufacture of beer. As examples, we would simply mention mangel-wurzel and potato starch.

It may be regarded as a general principle that whatever material is used as the basis of beer must either contain sugar or some ternary vegetable compound that is susceptible of being transformed into sugar under some special mode of chemical treatment. They must, however, be carbo-hydrates as regards their chemical composition; that is to say, they must consist of carbon in union with hydrogen and oxygen in the proportions necessary to form water. Cellulose, or woody fibre, is a substance of that sort, and it can be converted into sugar. Starch is another ternary compound of a similar character, and that is the body from which beer is almost universally made, no matter what species of grain is used. Another general principle is that, in order to render the starch or sugar serviceable as the basis of the beer, it must be naturally associated, or chemically treated in contact, with some form of albumenoid or nitrogenous matter, such as the gluten which forms a marked ingredient of most of the cereal grains.

Starting, then, with some form of amylaceous or saccharine matter, together with a quantity of albumenoid material, which can readily be made to undergo decomposition, we have got two of the conditions necessary for the production of the alcoholic beverage under consideration. In presence of an organic nitrogenous or albumenoid body, itself undergoing chemical change, sugar or chemically metamorphosed starch is ready to be broken up into alcohol and carbonic acid: in other words, the process called fermentation can

be induced in it; and in this way, therefore, we have made a decided advance on the way towards the product ultimately aimed at. But there is still something else wanted, which is a material to impart a peculiar bitter flavour to the liquor, and to contribute to its preservation from any chemical change of a detrimental character.

We shall now mention and briefly deal with the materials from which beer is manufactured. They are—(1) a cereal grain, by preference barley; (2) water, containing certain inorganic salts in solution; (3) a ferment, to bring about chemical change; and (4) hops, in which there are the necessary flavouring and preserving materials. At this stage we may state that the various processes which are had recourse to in dealing with those materials in the manufacture of beer collectively constitute the art of brewing. Hitherto it has been very much an empirical art, but it is gradually being placed on a scientific foundation, and in consequence the results aimed at are becoming more and more certain from day to day.

Barley and Malt.—As already indicated, barley is the cereal grain almost universally employed by the brewer in the production of beer, the chief reason being that it contains a very large quantity of starch and sugar, from which the alcohol is ultimately obtained, together with the requisite quantity of albumenoid matter to assist in bringing about the conversion of those compounds into alcohol, as well as aiding in giving body to the liquor. The grain has been, and is still to some extent, used in the raw state; but its employment in the form of malt is almost co-extensive with the beer-making industry, at least in the United Kingdom. It is undesirable that we should in this article occupy much space in speaking of malt and malting operations, but a brief statement seems to be absolutely necessary for the correct understanding of the subject under consideration; and for its further treatment we must refer the reader to the article *MALT*.

According to the analysis of Oudemans, dried barley contains as much as 65·7 per cent. of starch and 5·5 per cent. of dextrine, which is a variety of sugar, and is by some analysts termed sugar. Then, again, according to the same authority, gluten and other albumenoid substances are present to the extent of about 12 per cent. A certain portion of that nitrogenous matter is soluble in alcohol, but insoluble in water; another portion is soluble in water, and coagulable by heat; and a third and larger portion, which is also soluble in water, is not coagulated by heat; but by far the largest proportion is insoluble either in water or alcohol. It will be well to bear these facts in mind in studying the operations of the brewer.

Referring to the barley, it should be noted that the chief aim of the maltster is to convert the insoluble starch as completely as possible into soluble sugar, which is subsequently dissolved out of the malted grains in the first of those operations. He sets up artificial growth or germination, so as to induce the chemical change that is desired, and for that purpose he first of all puts the raw barley to steep in cisterns of water. The length of time over which the steeping operation is continued ranges, according to various circumstances, from forty hours up to ninety hours, but in general the range is from sixty hours up to seventy-two hours. Of course, in artificial as in natural germination, or sprouting of the grains, moisture is requisite, and hence the "steeping" operation. Next comes the "couching" of the grain, during which heat is generated—an elevation of temperature being an invariable attendant of the chemical action which is set up in the process of germination. For this purpose the steeped barley is thrown out of the cistern into the "couch," which is a square or rectangular frame formed on one of the floors of the malt-house; and in this it attains a thickness of from 12 to 24 or 30 inches. It "gathers heat" when massed in this way, and the germ begins to grow or sprout. The starchy matter surrounding

the germ or embryo serves as a store of food for the young plant, and under the influence of an elevation of temperature (amounting frequently to 10° Fahr.) that substance becomes changed into sugar and mucilage, which, being soluble, can be absorbed and assimilated by the growing parts of the embryo. Those parts are the radicles and the plumule, which are respectively the organs which, in the ordinary condition of things, become the root and the stem of the plant. While the grain is in the couch—usually a period of from twenty to twenty-six hours—the radicles and the plumule make their appearance at the tip of each grain, the former ultimately attaining a length equal to about one and a half lengths of the barley-corn, while the plumule, or acrospire (as it is termed by the maltster), has done little more than shown itself through the coverings of the seed. In order to encourage and continue the germinating process after that elevation of temperature has once been reached, the grain is spread out on the floor and kept as nearly as possible at a temperature of about 50° Fahr. for a period of five or six days, any further increase of heat being checked by frequently turning over the grain and spreading it out into thinner and thinner layers—starting with a depth, say, of 15 or 16 inches, and terminating with a thickness of 3 or 4 inches, or even less. The artificial growth that has thus been induced must be checked, otherwise the young plants would consume all the valuable contents of the grain. In order to curb, and even strangle, the life of the growing germ, an abundance of fresh air is allowed to stream through the malting-room towards the latter stages of the "flooring" process; the desiccation which consequently takes place causes the rootlets to wither and fall off at each turning operation. That is usually about the eleventh or twelfth day. The time necessary between the steep and the end of the flooring process ranges, according to the quality of the barley, the state of the weather, &c., from twelve to sixteen days for the production of good malt for brewers; and during that time about one-half of the starch is changed into sugar, and a large quantity of the gluten and albumen has been decomposed. The concluding stage of the malting operations is that known as drying or curing, which is done in a malt-kiln, and is therefore generally called "kiln-drying." This operation involves the employment of a high temperature, the heat being produced by the combustion of beech, or some variety of hard wood, or coke, or anthracite. Both the length of time the malt remains in the kiln and the temperature employed vary with the kind of malt desired. There are four kinds of malt—pale, amber, brown (or "blown"), and black, roasted, or patent malt. As will naturally be inferred, these gradations of colour are determined by the different heats employed. The brown and black varieties (the latter more especially) are used in the manufacture of porter and stout. Generally speaking, the drying or curing operation brings about not only complete desiccation of the grain, or dissipation of the moisture contained in it, but also a further important chemical change, so far as the starch is concerned, a very large proportion of what remained unaltered during the stage of germination being converted into sugar, partly by the high temperature employed and partly by the action of the gluten upon it. The fact that finished malt is much sweeter to the taste than barley is well known to persons who have no connection either with malting or brewing; and we may here state that kiln-dried malt is decidedly sweeter than that which is air-dried. It is also worthy of note that the albuminous compounds undergo chemical change during the state of kiln-drying, certain empyreumatic bodies being the result, which are also in part probably due to the alteration of some of the starch. Those empyreumatic products seem to exert an important influence in the preservation of the beer. Another advantage of kiln-drying, according to Graham (Society of Arts Cantor Lectures on "The Chemistry of

Brewing"), is that it diminishes the amount of the soluble albumenoid matters.

One of the soluble albumenoid compounds present in malt is called *diastase*, the peculiar property of which is that, under the influence of moisture and heat, it readily transforms starch into a soluble compound of a saccharine character, a substance which chemists for many years have been accustomed to speak of as *dextrine*; but the existence of such an intermediate product has been denied by Mr. C. O'Sullivan, the scientific adviser to Messrs. Bass & Co. It is the fact, however, that a sugary or saccharine body is formed; and there is good reason to believe that one part of diastase is powerful enough to transform 2000 parts of starch into that kind of sugar, whatever name it may receive from scientific chemists.

Water.—Many brewers, though not all, place a great deal of stress upon the quality of the water used in the extraction of the soluble ingredients of the malted barley. One thing, however, is certain, which is, that the less the amount of organic matter present in the water, the better will be the beer made from it. On the other hand, experience in recent years has most completely shown that the case is very different as regards the presence of certain inorganic or mineral salts in solution in the water. It is a very patent fact that the brewing trade has settled down at Burton-on-Trent on such a scale as to have become one of the most interesting industrial phenomena of the present day. There are no fewer than twenty-eight breweries in and about that town; and it has recently been stated, on good authority, that nearly one-tenth of all the beer brewed in the United Kingdom is made at Burton. When the quality of the well water employed there is taken into consideration, it will at once be seen that there is a sufficient explanation of that fact. That water is specially notable for the mineral compounds which it holds in solution, and, above all, for its sulphate of lime—about 19 grains per gallon; indeed, Messrs. Bass & Co.'s spring water has been found to contain as much as 54·4 grains of that compound per gallon. Certain other well waters used in brewing, as at Newark, Wellpark (Glasgow), Grantham, and Stratford-on-Avon, also contain more or less notable quantities of that compound in solution. Having in ordinary just referred to the water used at Wellpark Brewery, we may also state that water from the same springs was used for brewing by the monks so far back as the twelfth century; and it is undoubtedly the case that Messrs. Tennent, of that establishment, in a large measure owe their great success for upwards of half a century as export brewers to the peculiar composition of their well water. Briefly stated, it may be said that the practice of brewers in this country aims at having not too large a quantity of albuminous matter left in the liquor coming from the mash-tun, owing to the fact that it is very powerful in continuing fermentation beyond the point at which they wish it to cease. The practice of German brewers is totally different. They do not want the albuminous constituents of the malted grain coagulated and left in suspension in the liquor, which seems to be the function of the sulphate of lime (and possibly of other salts); they rather desire to keep or to get those compounds in the soluble condition, and to get all that is possible out of the malt. Of course, beers that are intended for keeping and for export should be finished with a minimum of fermentable matter amongst their constituents. Another advantage which is claimed for the use of hard water is, that more saccharine matter can be left in the beer, thereby increasing its fulness and flavour, and diminishing its liability to become acid. Before leaving this branch of the subject, we may give the opinion of a Glasgow brewer of great practical experience. He says, in one of the latest works dealing with these matters (Steel on "Brewing"), that it looks as if carbonate of lime were a principal and most necessary ingredient in

beer water, for though the beers made from pale malt benefit by the sulphate in some way, the products of browned and roasted malt do not, but are injured by it in quantity. And so pale beer may be said to be best with an excess of sulphate, and black beer with an excess of carbonate of lime in the water. The same gentleman a few years ago devised an arrangement for hardening soft waters at pleasure, by causing them to take up into solution a quantity of carbonate of lime, so as to fit them for making fine beers at any place where pure water and limestone can be had, and where a suitable climate exists. He points out also that water equal to that got at Burton can be obtained by adding 20 grains or so of sulphate of lime for each gallon of water used in the water-copper to dissolve out the essential ingredients of the malt. It is probable also, if not absolutely certain, that some of the mineral chlorides may with advantage be present in water used for brewing; and Dr. Charles Graham, in the lectures already referred to, suggests the desirability of adding both common salt (chloride of sodium) and sulphate of lime to pure soft waters, because by that means the water eventually used in the brew-house will, owing to the resulting double decomposition, contain no fewer than four salts—chloride of sodium, chloride of calcium, and the corresponding sulphates.

The Ferment.—It is not desirable that we should at this stage enlarge upon the material which is the specific agent in fermentation, and we would simply mention that it is the substance called *yeast*, which owes its efficacy to a lowly-organized cellular plant known as the *torula*, whose growth proceeds with extraordinary activity when all the necessary conditions for alcoholic fermentation are present. See FERMENTATION.

Hops.—Following the order already indicated in reference to the materials used in the manufacture of genuine beer, we have now to make a few remarks regarding hops. A member of the natural order of plants called *Urticaceæ*, and generically and specifically known as the *Humulus lupulus*, the hop is a most interesting plant from a scientific point of view, while to the practical brewer it is all important, on account of the pre eminent service which certain of its chemical constituents render to the beer. The hop is diocious as regards its structure and mode of reproduction, and it is only the female or fruit-bearing plant that is used, and indeed not the whole of it, but simply the strobiles or catkins which it bears. When ripe and prepared for the use of the brewer those structures consist of three essential parts—the scales or leafy bracts, mts, and lupulinic grains or glands; and it is in those grains—sometimes called "yellow powder"—that the special virtue of the plant resides. Taken in mass, the powdery or granular matter is spoken of under the name of "lupulin," as if it were a definite chemical compound; but it is not so, as it is found to yield on analysis a great variety of compounds, including, more especially, a volatile or essential oil (the "oil of hops"), lupulin proper, which is a peculiar and a characteristically bitter substance, and tannin or tannic acid. The aroma or flavour of beer, its general tone, and its power to resist acetous fermentation or acidification, seem to be all due to the presence in it of the compounds just named, and which are extracted from the hops in one of the processes which the brewer has recourse to in his ordinary daily work. When we come to speak of that process we shall have something further to say on the subject, but for a fuller account of the plant which yields those compounds the reader may consult the article Hops.

Brewing.—Under the term brewing there are included a series of processes by which an alcoholic fermented beverage is obtained from an infusion or decoction of malt and hops, in the production of which there are three essential and important stages, namely, the manufacture of "sweet

wort," the manufacture of "bitter wort," and that of fermentation or the formation of alcohol. A recent writer mentions six distinct operations—pumping, grinding, mashing, boiling, cooling, and fermenting and cleansing; but as the first and second are purely mechanical, we may very summarily dismiss them. The operation of pumping, at the beginning of the series of processes about to be noticed, has reference only to the securing of a constant supply of water from a reservoir at as high a level as may be necessary, in the event of the water being obtained from wells or rivers. Of course, where a town supply, obtained by gravitation, is taken advantage of, a high-service reservoir in or near the brewery is of minor importance. At this point it may be advisable to direct the attention of the reader to our Plate, which is a representation of a modern brewery in longitudinal and vertical section. The pumps, which are shown at A, in the basement story, have a variety of other work to perform besides raising the water to the high-level reservoir, B, which is called the "cold liquor back." Liquor in this case simply means water in its natural condition; and the term "back" is in frequent use in breweries, its general signification being a vessel for containing materials in their onward progress through the brew-house. Besides being at such a high level as to command every other utensil in the brewery, the liquor back is of large size, the dimensions varying with the productive capacity of the brewery and other circumstances.

The operation of grinding has reference to the preparation of the malt for the thorough extraction of all its useful constituents. Conveyed from the malt store, C, by suitable mechanical appliances, that material is transferred to the malt hopper, D, from which it descends by a shoot or spout to the grinding rolls, shown at E, in the basement story. This machine essentially consists of a couple of plane surfaced iron or steel rolls, revolving horizontally at a very short distance apart. The grain is delivered in between them at a suitable rate, and as it is crushed—not *ground*, in the strict sense of that term—it falls into a hopper underneath, and is now known as "grist." It is most undesirable that the grist should be in a very fine state of subdivision, but it certainly should be crushed so as to yield a rough granular powder, in order that it may afford a large amount of surface to the solvent action which the hot water exerts upon its farinaceous and other ingredients in the first of the brewing operations, properly so called, which we now proceed to notice.

Mashing.—This is undoubtedly the most important operation in the manufacture of beer, and the manner in which it is carried on will very greatly determine the excellence, or otherwise, of the produce of the brew-house. Returning to the grist, which we left in the "grist case" underneath the malt rolls, we follow it upwards as it is raised by the elevator, or "Jacob's ladder," shown at F F, to one or other of the two troughs in which the Archimedean worm screws work to the right or left, as indicated at G G, and which are set over the wooden hoppers, H H, also called "grist cases," these again being placed vertically over the mash-tuns, K K, on the floor below. These vessels are also commanded by the hot-liquor coppers, shown at I I, which should in turn likewise command the vessels in which the wort is boiled, unless it may be found more convenient to convey the wort to those vessels by the operation of pumping. The mash-tuns, which are usually vessels of very considerable capacity, consist chiefly of wood with an internal lining of copper. It may be noticed that they have false bottoms, which are necessary for straining the wort from the grains, for which purpose they are perforated. A very important feature of a mash-tun in a modern brewery is the "rake-shaft," a piece of mechanism which, by its revolution inside the tun, brings about a most thorough admixture of the grist with the hot water which is to act upon it, so that the solvent power of the latter

may come into play as soon as possible, and the mashing operation be completed with all due haste. Another structural feature of a mash-tun in many of the leading breweries is a mashing machine, shown at J J, the object of which is to bring the hot liquor and the grist into direct contact with each other immediately before they enter the tun. Within recent years there has been an extraordinary amount of discussion as to the proper temperature which the water should have as it meets the grist in the mash-tun, as also the temperature at which the mashing should be finished, and the time which should be occupied in reaching that point. The practical brewer formerly referred to (Steel on "Brewing"), assuming that there are three distinct stages in the mashing operation, which he calls saturating, saccharifying, and extracting, suggests the use of water of such a temperature as will give in the mash-tun (according to the strength of the beer) a range of from 148° to 152° Fahr. when the malt has been completely wetted, in which condition it is spoken of as "goods." That point being attained he would have water of a higher suitable heat applied, and the rake made to revolve until the "goods" are seen to touch the line of saccharification on the saccharometer; then the saccharifying heat should be continued for four or five hours, the heat of extraction being gradually reduced from the highest point down to that at which the brew began, say 150° Fahr. In some breweries the practice is to have one mash and a sparge, and in others it is two mashes and a sparge, while even a three-mash brew system is pursued in others. What is known as a "spurge" is a washing of the "goods" in the mash-tun with a spray of water at a suitable temperature, so as to extract such of the soluble matter as has not been removed by the mashing proper. It is in the mash-tun that the chemical effect of the diastase upon the starch comes into play, converting it into dextrine, and subsequently into glucose or grape sugar; and it is a chief aim of the brewer that his worts, as they are drained into the "underback" (shown at L in Plate), shall not contain a particle of unaltered starch. That is an all-important point in successful brewing. Just in passing, mention ought to be made of the important fact that it is at a temperature of about 170° Fahr. that the diastase exerts its chemical activity to most advantage. When all the soluble matter has been drained from the malt, the "grains," as the "goods" are now called, are removed, generally through a large opening in the bottom of the tun, and sold to dairymen and farmers for feeding cattle.

It is interesting to know that the mash-tuns in use at some of the large breweries are of very great capacity. In several cases the capacity is 160 quarters of malt, and there may be three or more of that sort in each brewery. One, at Messrs. Hoare & Co.'s brewery, can deal with 200 quarters of malt at one time, and at Messrs. Bass & Co.'s new brewery there are no fewer than nine mash-tuns all in a row, each capable of treating 60 quarters of malt.

Boiling and Hopping.—Assuming that the brewer has now got in the "underback" a wort possessing all the desired qualities as to clearness, sweetness, density, &c., his next aim is to protect it against putrid fermentation, by removing the excess of nitrogenous matter, which is so prone to decomposition, and against acidification; he therefore has recourse to boiling: an immediate result is that any contained air is expelled, and its oxidizing power is removed. This operation is performed in one of the steam-jacketed coppers, shown at M M, into which it is run at pleasure from the underback. The sweet wort is boiled along with hops, the amount of the latter varying with the kind of liquor wanted, and with the notions of the brewers. For some kinds of beer the quantity of hops used is as low as 4 lbs. per quarter of malt, while for others—prime export ales—it occasionally ranges up to 22 or 24 lbs. per quarter. The

coppers vary in size and in shape; some are open and others are closed during the boiling, and some of those of large size are generally fitted with an apparatus called a "rouser," for the purpose of keeping the wort and hops agitated, and so to prevent the hops from settling on the bottom of the copper and burning; frequently, however, the agitation is effected by an instrument in the form of a wooden paddle, known as a "rummager," and worked by hand. The length of time during which the boiling of the hopped wort continues also varies considerably. As a rule, however, it is not desirable that it should be continued longer than two hours, even for the third wort, in the brewing of ordinary beers. In that time the extractive matter of the hop is pretty well, if not entirely, dissolved out by the wort; and by the expiry of that time also the excess of albumenoid matter, which it is desired to remove from the liquor, has been coagulated and thrown down as a sediment. The last-mentioned result is effected by the tannin or tannic acid of the hops, so that it acts directly as a clarifying agent, and to that extent it may be said to contribute to the preservation of the beer. In virtue of their other ingredients, hops render beer stimulant and cordial, while by the peculiar bitterness possessed by the lupulin the sweetness of the malt extractive matter is quite neutralized; and that substance likewise gives to the liquor an aromatic and tonic character. The practice with some brewers in using hops is not to put the whole amount into the copper, but to reserve a portion, which is placed in a bag underneath the copper, and called a "hop back," and to run the hot "bitter wort" through it on its way to the cooler; and in that way an additional quantity of tannic acid is taken up into solution, as also a quantity of the essential oil formerly referred to. By this mode of working, the mass of hops in the hop back serves as an excellent filter for clarifying the liquor. The hops, after being thoroughly exhausted of their valuable ingredients—which, in some breweries, is done in two boilings—are generally subjected to a powerful pressure before being discharged from the brew-house, so as to deprive them of all the liquor which they mechanically hold.

Cooling.—So soon as the bitter wort has been separated from the hops it is cooled as rapidly as possible, in order that it may be prepared for undergoing the important change known as fermentation. For this purpose it is run out upon the "cooler," which is a shallow tank of considerable extent, usually placed at an elevated part of the brewery, the aim being to get a free through-and-through current of air to blow over the exposed surface of the liquor. It is represented at *n* in the Plate. In recent years, however, that mode of cooling is not deemed sufficiently rapid, and hence what is called a "refrigerator" has been brought into very extensive use in the large breweries. There are various kinds of refrigerators, but they all may be said to agree in this general principle, namely, that they expose the liquor to the cooling action of a stream of water, separated from it by a thin layer of metal. It is most desirable that the liquor should be cooled down with all due speed to a temperature ranging from 60° down to 56° Fahr., and more especially to the latter during summer. To do so is easily accomplished when there is plenty of refrigerator power, and in cases where the brewery is provided with an abundant supply of water from a deep well. The position of the refrigerator is indicated at *o*.

Fermentation.—As it streams away from the refrigerator at the desired temperature the liquor runs away to the tun-room, marked *s* in the Plate, and enters one or other of the fermenting tuns, *r, r*, one of which is shown in vertical section. The liquor is here mixed with yeast, so as to excite fermentation in its contained saccharine ingredients, and to continue that process of decomposition as long as may be desired. What is aimed at in this important stage of the brewer's work is to secure the successful "attenua-

tion" of the wort; in other words, to bring about an alcoholic condition in the wort by the decomposition of the sugary matter, which change is also attended with the elimination of a large quantity of carbonic acid gas and the production of new yeast. While the methods of fermentation—that is to say, the apparatus for attenuation—are numerous, some of which are known as the London system, the Burton system, the Yorkshire system, and the Edinburgh system, they all end in one system, namely, apparatus for attenuation. Treating of this part of the subject, a recent writer has put the matter into a nutshell. He says—"The wort unattenuated goes in at one end of the process, and comes out attenuated at the other; it has given off a large quantity of carbonic acid gas and yeast, and in return has become highly alcoholized." It is of great importance that the heat of attenuation should be most carefully attended to. When fullness is wanted in strong mild beers the fermentation ought to be carried on at as low a heat as possible, beginning, say, at 56°, and finishing not higher than 66° Fahr. In fermenting hopped beers, whether pale ale or porter, a considerable heat is needed to mellow down the excess of hop extract, and take off its raw vegetable flavour; but even this heat requires to be checked if, in the case of ale, it rises to 72°, or to 76° in the case of porter. The fermenting tuns employed are frequently of gigantic size, although in breweries worked on the Edinburgh system they are, as a rule, comparatively small, being made to contain from 40 to 50 barrels. In some instances the London breweries have tuns with a capacity of even 1500 barrels each. At *q* there is indicated a piece of mechanism called the skimming apparatus, consisting essentially of a vertical shaft, which is tubular, and of a large funnel, in which it terminates above. During a large portion of the time (three days or so) that the liquor remains in the fermenting tun this shaft is made to rotate, and the new yeast, as it forms and rises to the surface, gets skimmed off by means of the revolving funnel, subsequently passing down the tube, and collected by some convenient arrangement. There is also shown at *n* a coil of piping, known as an "attenuator," through which, when desired, a current of cold water is run, so as to regulate the heat of attenuation as it rises during the chemical decomposition of the saccharine matter, which is really the essential feature of the process of fermentation. At the same time, however, great care is necessary in the use of attenuators or fermenting tun refrigerators, as a sudden application of the cold will throw down the yeast, and bring the attenuation to a standstill.

Cleansing.—No matter how carefully the yeast may have been skimmed off the surface of the liquor, there are still greater or less quantities of albumenoid matters present in mechanical suspension and in a state of chemical degradation; and in order to get quit of these the operation of "cleansing" is resorted to. It is performed in a variety of ways; but one method is, to run off the beer from the tun into a series of barrels ranged side by side over a trough or stillion, in which it remains for several days. The bung-hole is left open, and the yeast as it rises escapes by that opening, and is allowed to drop into the trough or stillion. When the yeast ceases to run out the beer is bunged up and put into store. Another method of effecting the cleansing is to take advantage of the arrangement indicated at *r* in the Plate. The "union cleansing casks" there shown have their bung-holes connected by means of swan-neck copper tubes with the yeast stillion placed above, so that the yeast is allowed to work upwards to that height. By suitable arrangements the casks while *in situ* both receive the beer from the "feed back," and discharge it after cleansing into a "settling back," or racking vessel, from which the barrels are filled either for store or for being immediately sent out. In many cases the beer is also kept in store in large tuns or vats.

BEER, ACTS RELATING TO SALE OF. In the eleventh year of Henry VII. (1496) an Act was passed "against vacabounds and beggers" (11 Hen. VII. c. 2), which contained a clause empowering two justices of the peace "to rejecte and put away comen ale-selling in townes and places where they shall thinke convenient, and to take surteie of the keepers of ale-houses of their gode behavyng by the discrecion of the seid justices, and in the same to be avysed and agreed at the tyme of their sessions." From that time to the present the sale of intoxicating liquors has been from time to time regulated by Acts of Parliament.

In 1828 a general Act to regulate the granting of ale-house licenses was passed (9 Geo. IV. c. 61), which repealed all former statutes on this subject. The most important of the unrevoked provisions of this Act are that licenses are to be granted annually, at a special session of magistrates, to be called the General Annual Licensing Meeting. Any person who is refused a license may appeal to the quarter sessions; and no justice is to act in an appeal who was concerned in the refusal of the license.

The most important Acts, however, now in force are those for "regulating the sale of intoxicating liquors," known as "The Licensing Act, 1872," or 35 & 36 Vict. c. 34; and "The Licensing Act, 1874," or 37 & 38 Vict. c. 49. The latter Act was introduced by the government to effect certain amendments in the former one, and the two are consequently so intimately connected that provision is made for constraining the two as one Act, to be cited as "The Licensing Acts, 1872-74." In the second Act the first one is referred to as the "principal Act."

The first part of the principal Act relates to illicit sales of intoxicating liquor, and declares the penalties to be enforced or imprisonment to be awarded. And it is to be observed that fines and imprisonment are not the only unpleasant consequences entailed upon publicans by offences under these Acts. By the first one it was provided that the most important offences must be, and nearly all may be, recorded upon the license held. It was considered that a check was by this means provided upon the owner of the house, inasmuch as repeated indorsements disqualified the house, thus reducing the value of the property. Under the Act of 1874, however, no offences are now recorded on the license unless the justices order them to be so recorded, a wider discretion in this respect being thus given to the justices. In other respects the Act of 1872 stands good; and if a licensee with two convictions recorded upon his license be convicted of an offence which has been already directed by the justices to be recorded on the license, such license is forfeited, the offender (in addition to other punishment) will be disqualified from holding a license for five years, and the premises may be disqualified for two years. No conviction, however, counts in evidence against a publican after the lapse of five years. A licensee who obliterates any record upon his license is liable to a fine of £5. The Act provides for the establishment of a register of licenses in each district, on which is entered particulars of all persons and premises licensed, and of recorded convictions, forfeitures, and disqualifications; such register to be open for inspection on payment of 1s. The name of the owner of any licensed house is also kept in this register, he having a special interest in the good behaviour of his tenant, inasmuch as the second conviction recorded against the trader is recorded against the premises also, and four convictions within five years disqualifies the premises for one year.

Under the heading "Offences against public order," a person found drunk is liable to penalties increasing from 10s. for a first to 40s. for subsequent offences. If any licensed person permits drunkenness, or any violent, quarrelsome, or riotous conduct on his premises, or sells intoxicating liquor to any drunken person, he entails a penalty of £10 for the first and £20 for any subsequent offence. There are penalties for keeping disorderly houses, for har-

bouring or bribing constables, and for permitting gaming. Permitting his house to be used as a brothel entails not only the forfeiture of the landlord's license and a fine of £20, but disqualifies him for ever from holding any license. Drunkards may be excluded from public-houses, and if such persons refuse to leave when required, they are liable to a penalty not exceeding £5, may be removed by a constable, and failing to pay the fine may be imprisoned with hard labour.

The principal Act provided stringent and highly penal provisions against adulteration. These, however, were repealed by the Act of 1874, and the General Adulteration Act of 1872 now applies to the publican the same as to the grocer and all other tradesmen. Convictions for adulteration, however, are to be recorded in the general license register, and may be directed to be indorsed on the license.

Licensed houses may be closed by order of justices in case of a riot, and disobedience involves closing by force, and a fine of £50.

The Act of 1874 made some material alterations in that of 1872 as respects the hours of opening and closing. For these purposes the country is divided into three sections, viz. (1) the metropolis, within 4 miles of Charing Cross; (2) the metropolitan police district beyond these limits, and boroughs, towns, and populous places; and (3) rural parishes. A place to be decided as "populous" by the magistrates must contain at least 1000 inhabitants. Premises within section 1 have to be closed at 12.30 a.m. and open at 5 a.m. Premises within section 2 open at 6 a.m. and close at 11 p.m. And houses within section 3 open at 6 a.m. and close at 10 p.m. On Sunday, Christmas Day, and Good Friday, premises in section 1 are to close all day before 1 o'clock, between 3 and 6 in the afternoon, and after 11 at night. On these days, in sections 2 and 3, all day before half-past 12 o'clock, from half past 2 till 6, and after 10 at night. The exceptions formerly made in favour of the public-houses near theatres, &c., are now abolished, as is also the discretion of magistrates as to the hours of closing in the metropolis, boroughs, and towns, these being now fixed by the statute. The only discretion as to hours left by the Act of 1874 is in the power of deciding whether a place or district of at least 1000 inhabitants is "populous" or not; and if places under 2500 inhabitants are decided to be populous, the houses therein will then remain open one hour longer than previously permitted. No liquor is allowed to be consumed in licensed premises after the hours named for closing, though purchased before such hours. The houses must actually be closed at 10, 11, or 12.30 as the case may be.

Publicans need not keep their houses open the full hours allowed, but if trading is carried on within the times specified for closing there is a fine of £10 for the first and £20 for each subsequent offence. Lodgers and *bona fide* travellers are exempt from these provisions, as are also customers at railway refreshment rooms who have arrived or are about to depart by train from the station at which they are served. The proof of the *bona fides* of a traveller is to be shared between the traveller, informer, and publican; one essential qualification, by the 1874 amendments, being that the place where the traveller lodged the previous night be at least 3 miles by the nearest public thoroughfare from the house at which he is supplied.

The existing division of the country into licensing districts, under the Act of 1828, was continued by the Act of 1872, and to the justices of such districts applications are still to be made. But no new license is valid unless confirmed by a "county licensing committee" of from three to twelve members appointed by the justices in quarter sessions.

Every person intending to apply for a license must give twenty-one days' notice in writing to the overseers or other proper authorities, and also affix a similar notice on two

consecutive Sundays on the door of the principal church or chapel; and if there be no church or chapel, then on some other public and conspicuous place within the parish. He must also advertise such notice in a paper circulating in the place in which the premises are situate, on some day not more than four and not less than two weeks before the proposed application. Similar proceedings must be taken in the case of the transfer of a license.

Section 22 of the 1874 Act saved much uncertain and speculative outlay upon new houses. By it persons wishing to build may present to the justices a plan of the intended new premises, and the magistrates may make a provisional grant, as an undertaking that if the premises are completed according to plan deposited a license will then be granted.

Premises, to be qualified for a license, must be of a specified annual value: in the metropolis or in towns of 100,000 inhabitants (the population being ascertained by reference to the last census), £50, or £30 if no spirits are to be sold; in towns of from 10,000 to 100,000, £30 and £20; and £15 and £12 elsewhere. A surveyor may be appointed (at the cost of the applicant) who shall determine if the premises are of the requisite value, on the ground that they would command the specified rent even if not licensed. The licensing authorities must also be satisfied that the premises are structurally fit for their purpose; and where spirits are to be sold must contain at least two, in other cases one, room for the accommodation of the public, exclusive of those occupied by the inmates.

Six-day licenses may be granted on special application, and at abatement of one-seventh of the ordinary duty. But the holder of such a license must keep his house closed during the whole of Sunday, or incur the penalties of unlicensed trading. A further remission of one-seventh is granted those who, from personal inclination or some peculiarity in the situation of the house, may wish to close an hour earlier on week nights.

Offenders by illicit sales include persons who sell by retail any intoxicating liquor (1) without any license; (2) of a kind not authorized by the seller's license, as where a beer-house keeper sells spirits; (3) at a place not mentioned in the license. In all these cases conviction carries with it the loss of the license, and a penalty for the first offence of £50 or a month's imprisonment; for the second, £100 or three months, and (by order of court) five years' disqualification from license-holding; for the third, £100 or six months, and (by order of court) disqualification for any term of years or in perpetuity.

Licenses selling spirits to persons apparently under sixteen, to be consumed on the premises, may be fined 20s. for the first and 40s. for each future offence.

All retail sales, except in cask or bottle, must be by imperial measure. For making or using intemperate communication between licensed premises and unlicensed premises used for public entertainment or refreshment, the penalty is £10 per day, and loss of license. Every licensee is to keep his name painted or fixed on his premises, with words sufficient correctly to express the nature and extent of the license he holds, under a penalty of £10, or £20 afterwards. Licenses must be produced and shown on demand by any justice of the peace, revenue or police officer, under penalty of £10. A constable may at all times enter licensed premises for the purpose of preventing or detecting any violation of the Licensing Acts. Any opposition offered is punishable with a fine of £5, doubled if the offence be repeated. By a magistrate's warrant, unlicensed premises may be searched in the same way, and if suspicious storage of intoxicating liquor is found it may be seized, and persons found upon the premises illegally dealing in such liquor may be fined 40s. Special licenses may be granted to publicans and beer-house keepers who comply with certain formularies, for the sale of beer, &c., at places away from

their houses of business, such as cricket matches, fairs, races, &c. Magistrates interested in the liquor trade, as brewers, distillers, maltsters, or malt dealers, or who have a beneficial interest in premises whose owners are charged with offences under the Act, are forbidden to adjudicate, except upon charges of drunkenness, under a penalty of £100. Half the penalties recovered may be awarded by the magistrates to the police superannuation fund, and no penalty, except for a first offence, can be reduced to less than 20s., or below the minimum fixed by statute for police or excise offences. All notices may be served by post, but those to owners must be by registered letter.

Under the Forbes Mackenzie Act, passed in 1853 (16 & 17 Vict. c. 67), houses for the sale of intoxicating liquors are closed entirely in Scotland on Sundays. In 1880 a similar Act was passed with respect to Ireland, and another for Wales in 1881.

BEER-ALSTON, a small town of Devonshire, situated in a picturesque country between the rivers Tamar and Tavy, 10 miles N. from Plymouth, and 265 from London, being 6 miles N.W. from the Horrabridge station of the South Devon Railway. Great quantities of fruit are grown near the town, especially the black cherries known as "mazards." Beer-Alston is included in the parish of Beerferries.

BEER-SHEBA (the "Well of the Oath") is a very ancient city in the south of Palestine, the existence of which can be traced from the days of the patriarchs to the present time. "Abraham called that place Beer-sheba because, when he made a covenant with Abimelech, they took an oath there." It was frequently the dwelling-place of Abraham, Isaac, and Jacob; and Elijah retired to Beer-sheba when he fled before Ahab and Jezebel. It is mentioned by De Vitry as a town 10 miles from Ascalon, and is still extant, under the name of Bir es Seba, on a stream which falls into the sea at Gaza, 27 miles distant. Hardly any remains of buildings are left, but its two wells are still open, and afford an abundant supply of pure water. Its position on the road to Egypt rendered Beer-sheba a place of importance, which it continued to be under the Romans and down to the time of the Crusades. (Robinson's "Researches," i. 301.)

This Beer-sheba should not be confounded with a Beer-sheba in Upper Galilee, which is mentioned by Josephus and in Dr. Richardson's "Travels."

BEES, ST. See SAINT BEES.

BEET (*Beta*) is a genus of plants belonging to the order CHENOPODIACEAE, among which it is known by its having large succulent roots, and a green calyx united half-way to a hard rugged nut.

Beta vulgaris (common beet) and *Beta maritima* (sea beet) are now included by Moquin as one species (*Beta vulgaris*). It is well known that many roots become fleshy through cultivation. It is found wild in the Canary Islands, and in the whole region of the Mediterranean as far as the Caspian Sea, Persia, and Babylon. De Caudolle, in "L'Origine des Plantes Cultivées" (1883), considers that its cultivation does not date further back than five or six centuries before the Christian era. The cultivated variety was only introduced into England in 1656.

Mangold-wurzel is a large and coarse variety of the common beet, from which it is principally known by its roots being marked internally with zones of red and white. It is extensively cultivated for feeding cattle. The roots of a white variety, which is smaller than mangold, are used for the manufacture of sugar. This is the *betterave à sucre* of the French.

Beta cicla (Sicilian beet) produces succulent leaves only. It is chiefly cultivated in gardens as a culinary vegetable, and forms one of the principal vegetables used by agricultural labourers and small occupiers of land in many parts of Germany, France, and Switzerland. A variety known by the name of Swiss Chard (*poirée*) produces numerous

large succulent leaves, which have a very solid rib running along the middle. The leafy part, being stripped off and boiled, is used as a substitute for greens and spinach, and the rib and stalk are dressed like asparagus or scorszonera; they have a pleasant sweet taste, and are very wholesome. In a good soil the produce is very abundant, and if cultivated on a large scale in the field this species of beet proves a very valuable addition to the plants raised for cattle. If sown in May in drills 2 feet wide, and thinned out to the distance of a foot in the rows, they will produce an abundance of leaves, which may be gathered in August and September, and will grow again rapidly, provided a bunch of the centre leaves be left on each plant.

Beet-root, especially that variety called the *red beet*, when boiled and sliced, makes an excellent addition to salads. All the varieties are tender, and destroyed by frost when in their young state. It thrives best in a rich, light, dry soil, and from the length of its tap root requires a considerable depth. The ground should be subterranean and well broken, which will the better prevent the roots from forking. The seeds should be sown in April in drills 12 inches apart, and then covered lightly.

Mangold-wurzel was introduced into England at the latter end of the last century. The principal part of the root rises often a foot and more above the ground, and the leaves, which are large and succulent, spring from the crown of the root. The soil best adapted for the mangold is a deep sandy loam, naturally rich, or made so by repeated manuring. The seed is sown in May. After they come up and are out of danger of frost or insects they are thinned out, so as to leave the plants a foot asunder. A sprinkling of liquid manure along the rows, about the time that the plants first appear above ground, will in general secure an abundance of them. When the plants are thinned out, care is taken to stir the ground between them. As soon as the outer leaves begin to droop they may be gathered and given to cattle; but a tuft should be left in the centre, or else the roots will not increase; and care also should be taken not to strip off fresh and growing leaves. The roots are generally taken up and stored for winter some time before there is any danger of considerable frost; the top having been removed, and the tap-root cut off, the mould which may adhere to the fibres is scraped off with the back of the knife. The roots are then either stacked in a barn or root-house, with alternate layers of straw, or they are placed in trenches, well protected from the weather. In either case the roots ought to be allowed to dry, and to slightly ferment before being covered, or they will be injured in quality during the storing. There are few crops so valuable for food for cattle as the beet; Swedish turnips exceed them in the quantity of nourishment, weight for weight, but on good light soils the produce of the beet per acre is much greater. It is some time after storing before the roots can be used with advantage; for in autumn and the early part of the winter, their juices being unripened, they have a laxative effect on animals. Swedish turnips are at this time of the year preferred for feeding; but the harshness of the mangold wears off by the spring, and it then becomes an excellent food for stock of all kinds, and if well kept will retain its juiciness till the middle of the summer.

The white beet or Silesian beet, chiefly cultivated for the extraction of sugar from its juice, is considered by some to be a separate species, *Beta alba* (see Plate SUGAR). It is smaller than the mangold-wurzel, and more compact, and is in its texture more like the Swedish turnip. The beet-root sugar manufacture sprang up in France in consequence of Bonaparte's scheme for destroying the colonial prosperity of Great Britain by excluding British colonial produce. It having been found that from the juice of the beet-root a crystallizable sugar could be obtained, he encouraged the establishment of the manufacture in every possible way. The process pursued at the present day is as follows:—The roots,

after being cleansed by washing and scraping, are sliced into finger-pieces, somewhat as turnips are cut for sheep, and then soaked in water. The sugar gradually passes out into the water. To wash out the sugar thoroughly the charge of water lying for a time upon one lot of slices is passed on to other lots, so that each lot goes successively through various stages of immersion. The apparatus has been lately improved, so as to render this series of diffusions almost automatic. The beet-juice is heated in a copper to about 178° Fabr.; lime-water is then added, and stirred up with it. Having been mixed with animal charcoal it is made to boil, by which both a scum and sediment are separated from it. The clear liquor is drawn off, and is evaporated in shallow vessels; the process is continued till the juice becomes a thick syrup, which is then strained through a linen bag. The syrup is again boiled and skimmed, and then transferred to a cooler, where it remains for a short time. It is next transferred to sugar moulds, and treated pretty much in the same way as the sugar-cane juice, described under SUGAR. In 1883 there were about 330 beet sugar factories in Russia, 350 in Germany, and 440 in France.

In a country of small area and large population, such as Britain, the soil ought to be made to provide work as well as food. Our crops should be those which set the factory in operation, in preference to those which pass, as it were, from the field direct to the pantry. Fifty years ago there was a comparatively small quantity of sugar extracted from beet. In the season 1871-72 the sugar-produce of the Continent had risen to 1,000,000 tons, and increased by the season 1882-83 to the total of 1,700,000 tons, being an increase of 70 per cent. in the short space of eleven years; and this amount forms more than one-third of the sugar production of the whole world from every source—cane, beet, maple, and palm.

Mr. James Duncan carried out a series of experiments at Lavenham, Suffolk, from 1868 to 1873, which were, on the whole, successful, although the works were ultimately closed. The farmer ran very little risk in the experiment, for it is clearly proved that 1 ton of English sugar beet is equivalent in nutritive qualities as cattle food to 1½ ton of common mangold. Therefore, if the farmer cannot deal with the sugar factor, he can use the beet with the same advantage for cattle food, as, though the crop is less bulky, his 20-ton crop of beet will be as nutritive as the 30-ton crop of mangold. For every ton of roots delivered at the Lavenham factory the farmer received £1, and he carried back to his farm dry pulp, or beet bread, at the rate of 12s. per ton. The feeding value of common mangold has been assessed at about 7s. per ton. It is worth about as much for conversion into beef. Sugar beet, weight for weight, is worth possibly, for conversion into beef, 10s. per ton. The excess of sugar makes it more valuable for feeding purposes. But, assuming its superiority, here is 10s. clear profit to the farmer, minus, however, the expense of carriage, by selling it to the sugar-maker.

But this by no means exhausts the farmer's advantages derived from beet-growing. Of course when a farmer converts his mangold or his sugar beet into beef there is an end of it. The 7s. 6d. or 10s. per ton exhausts its value. But it is far otherwise with the roots sent to the sugar factory. The same carts which carried beet in, in the gross, returned carrying most of its flesh-forming matter back in detail. Eight tons of beet are required to form one of pulp, and this pulp is the veritable essence of the beet itself, minus all its water, and perhaps four-fifths of its sugar. Experience has proved that the pulp is most nourishing and grateful food.

Beet-root Spirit.—In France there are about 500 beet-root distilleries, the plan adopted in most of them being to use for spirits the roots that are too poor in saccharine matter to be suitable for sugar. The spirit itself is not much

used as a beverage, but is combined generally with cognac, cordials, wines, or liqueurs to form various compounds.

Beet-root distilleries were first established in England in 1858, but the venture was not successful. In the question of a revival of the manufacture, agricultural processes, manufacturing operations, excise regulations, and foreign competition, are all involved to a large degree. Recent experiments would seem to show that beet-root distilleries may be profitably worked in agricultural districts.

BEETHOVEN, LUDWIG VAN, the illustrious musician, was born at Bonn, 17th December, 1770, and died at Vienna, 26th March, 1827. A groundless rumour for some time prevailed that he was the natural son of the King of Prussia; and at considerable pains he proved himself to be the lawful child of Johann Beethoven, a tenor singer of moderate ability and intemperate habits, in the chapel of the electoral prince in his native town. In this establishment his grandfather, after whom he was named, and who was also a composer, sang bass. Whatever the professional ability and personal irregularities of his father, the position of this choir singer was such as to give Beethoven the advantage enjoyed by all the greatest musicians, of becoming familiar in his earliest infancy with music, and receiving his first impressions from it; his organization had thus immediate opportunity for development, and he at once gave tokens of a strong natural disposition for the art he conspicuously advanced. His father, hoping to improve the slender means of the family by the display of the child's ability, was the first to undertake his technical training; but dissipation rendered him an unfit instructor. The boy's studies were, however, assisted by Pfeiffer, an able player and director of a military band, to whom in after years he made the kindest acknowledgment of the obligation he owed him. He evinced so remarkable a talent as to attract the attention of the reigning elector, the Archduke Maximilian, at whose charge he received lessons of Van der Eder, the court organist, and at his death of his successor Neefe. Beethoven's restless disposition rendered steady practice irksome to him; and his father's impatience at this increased his distaste to application. He, however, progressed so rapidly that at eight years old he was already remarkable for his playing of the fugues of Sebastian Bach. His three sonatas, written when he was ten years old, prove his early acquaintance with the principles of musical construction. These interesting productions, as well as some songs and some pianoforte variations, were printed in 1783. Sterkel, a pianist of some repute in his day, on seeing the variations, questioned the ability of their author to play them; whereupon Beethoven not only executed his printed piece, but improvised upon the same theme in imitation of the manner of his sceptical critic, proving at once his agile finger and his prompt invention. This is the earliest anecdote of his marvellous extemporaneous power, which afterwards became one of the most remarkable manifestations of his genius. Coincident with his progress on the pianoforte and in composition was his practice of the violin, which, if it led to no notable proficiency, enabled him to write most effectively for stringed instruments throughout his career. His father's dissolute life seems to have excluded the best domestic influences from his home; but he found a circle of true and genial friends in the family of Breuning. His first connection with this family was in the capacity of teacher, the duties of which he always discharged with the utmost repugnance; the widow Von Breuning not only forgave his constant dereliction, but with parental kindness encouraged his companionship of her children, amongst whom he became familiar with literature, and so made up for the scanty education he had received at the free school. Before the completion of his fifteenth year the elector appointed Beethoven organist of his chapel. In this situation he played off one of those practical jokes for which, to the

last, he had an especial relish, in confusing a conceited singer who chanted the Lamentations in Passion Week, by changing the key in the accompaniment during a sustained note of the voice; the compromised chanter complained of this trick to the elector, and Beethoven received an official reprimand. The genial humour, which is one of the most prominent characteristics of Beethoven's writing—showing a love of fun and a capacity for witticism, that has never so fully been elsewhere embodied in music—is powerfully illustrated by this personal trait of the composer, which stopped not at practical jesting, but led him to indulge in every kind of caprice that presented itself to his vivacious fancy. His ordinary conversation abounded with bon mots and repartee (sometimes not very subtle), he exulted in mock heroic grandiloquence, and would risk a friendship rather than forego a banter. He had at this time another patron besides the elector, in Count Waldstein—to whom he subsequently dedicated his grand sonata in C, Op. 53. Beethoven wrote the music, of which the count had the credit, for a ballet represented by the nobility at the court; but he was more than repaid for this sacrifice by being, at his patron's instigation, sent in 1787 on a mission to Vienna, where he became acquainted with Mozart, and indeed received some lessons from him. Shortly after the completion of his twenty-first year, through the liberality of the elector, he made his second visit to Vienna, where he found so many advantageous opportunities that his return was repeatedly deferred, until he decided to make the Austrian capital his permanent residence. His father died in this year, and he was now launched in the world with no care but for his art and for his own progress in it. Mozart was no more; but his influence was perhaps stronger than when he was personally present to exert it; thus the highest class of music was in general esteem, and the most aspiring genius found ready recognition and cordial encouragement. Baron von Swieten—who engaged Mozart to instrument the "Messiah," and who furnished Haydn with the text of the "Creation"—had frequent musical performances, in which Beethoven constantly participated; and Prince Liechowsky settled upon him an annuity of 600 florins, to be continued till he should obtain an official appointment; but this was only one among countless services that his truly noble friend rendered to the artist, which Beethoven acknowledged in his dedications to him and to his brother, Count Moritz, of several of his most important works. The prince showed, indeed, a most cordial zeal for the musician in his tolerance of the countless caprices of his client, who bore his favours so gracelessly as often to dine at a tavern rather than submit to the restraint of dressing and of punctual presence at the prince's table, and to give many other such whimsical tokens of independence.

Settled at Vienna, Beethoven placed himself under the tuition of Haydn; but on showing some pieces the master had revised to Schenk, a creditable composer, who pointed out errors in them which Haydn had overlooked, he formed the idea, which he never relinquished, that he received lessons, but not instruction from him. Under this impression he refused Haydn's proposal that he should style himself his pupil on the works he printed. His irritable temper was further excited by Haydn's advising him, with worldly prudence, not to publish the third of his first set of trios—that in C minor—which Beethoven considered, and posterity confirmed the judgment, the best of the three. He dedicated to him, however, the next work he printed, and so paid him a worthy homage without compromising himself. Though he had previously published several works, and had written many that have never appeared, the trios were the first to which he affixed a number; and we may infer from this that he chose to date his career as a composer from them. It may have been among his causes of dissatisfaction with Haydn that this master

thought more highly of him as a player than as a composer; and so sanctioned an opinion, repugnant to his self-esteem, that was then prevalent. His playing may well have raised the enthusiasm of all who heard it; for though wanting in mechanical finish and even occasionally in accuracy, it had a charm, from its deep expression, from its fiery energy, and from its highly-wrought character—from, in fact, the thoroughly artistic spirit it embodied, which has never been surpassed; and we have little to wonder that the less appreciable talent of composition should have been at the time partially eclipsed by one so dazzling. Beethoven was glad to take the opportunity of Haydn's second visit to England in 1794 for breaking connection with him; and immediately placed himself under Albrechtsberger, with whom he went through a course of contrapuntal study. His counterpoint has an effect of stiffness and effort singularly opposed to the spontaneous freedom that characterizes everything else he wrote. But this results not from unskilful training and insufficient knowledge; it is rather because the nature of his ideas renders them insusceptible of this kind of treatment, and crudity is the consequence of forcing them into un congenial development. There are, indeed, some grand exceptions from this generalization—the last movement of the *Eroica* above all others; but there still exist too many examples to justify the remark. About this time Beethoven made his only artistic tour, visiting Leipzig and Berlin, where he played several times at court, received a handsome gift from the king, and wrote his first two violoncello sonatas to perform with the then popular Dupont. At this time he took lessons in dramatic composition of Salieri. In the Prussian capital, also, he met with Prince Louis Ferdinand, the patron and pupil of Dussek, whose musical taste he acknowledged, and who proved this by his appreciation of the genius of Beethoven. Shortly after his return to Vienna a fashionable countess gave an entertainment to bring this famous dilettante and artist together, when she greatly incensed the latter by not assigning to him a place at the nobility's table in the supper room, for which, however, the prince made some amends by seating the composer on his right and the countess on his left hand at a dinner of his own; but Beethoven had already resented the indignity put upon him and his art, and thus given the first proof that is recorded of the republicanism which was his indomitable political principle. Strange as it may seem that, surrounded by the adoring aristocracy of the country, and fostered with a truly fraternal fondness by them, he should have nourished such a feeling, his proud independence was unswerving, and he would have sacrificed the highest worldly advantages rather than suffer this in the slightest degree to be compromised.

Of all the great musicians that have been, no one has shown such a continual development of his genius as Beethoven, and so great was this with him that critics have, not unjustly, classed his works in three separate styles, corresponding with three periods of his life; but although his mind was in an incessant state of progress, and the productions of each epoch are manifestly distinguished from those of the other two, this distinction must be understood to refer to style and not to merit, since in his latest years he wrote bagatelles and other simple pieces; whereas in this early time he produced some of his greatest if not his most individual masterpieces, such as the Piano-forte Sonata in E flat, Op. 7, the Quintet in the same key, and the "Sonate Pathétique."

In 1796 he first began to suffer from that dreadful malady, the worst evil to which he of all men could be subject, which embittered his life, which influenced his character, which excluded him from society, and which cannot have been without its important effect upon his music—the loss of hearing. Space will not permit the recital of the many painful incidents that sprang from this calamity;

but it must be noticed that it made him irritable in temper, violent in manner, and suspicious to the last degree, detesting to play or even to appear in company, and distrustful of every one, even of those most zealous in his interest. It is needless to trace the course of the disease through thirty years, which, baffling the greatest medical skill and proceeding by degrees, ended in almost total deafness. Nothing can be more pathetic than the manner in which he speaks of his affliction in his letters, but it cannot require his own words of complaint to make us estimate the misery it occasioned him.

At this time the famous quartet party, of which Schuppanzigh was the first violin, first met at the residence of the Russian ambassador Count Rasumowsky. For Beethoven to witness their remarkable performances was for him to be incited to write for them, and he accordingly now produced his string Quartet in D, which was rapidly followed by the other five published with it. He was closely connected with this eminently artistic association to the end of his life, and wrote all his works of that class with a special view to their performance; his transcendent excellence as a quartet writer is thus, in some sort, a consequence of the excellence of this party.

His general habit of composition was to set down every idea as it occurred to him, and afterwards to amalgamate these into complete movements; he would even modify a phrase in many different forms upon paper before he was satisfied to incorporate it into a work; and thus he employed his sketch-book as Mozart did his memory, making it the crucible in which he moulded his creations into maturity. He frequently pondered in this manner for very long upon a composition, and would sometimes have several in progress at once; but, on the contrary, he would occasionally produce a work with the promptness of improvisation; thus the charming Horn Sonata, which he wrote to play with the celebrated Punto, had not a note on paper the day before the performance, and both executants had to read from the author's manuscript; and there are several instances of the same kind.

This first period of his career may be considered to close with the (second) Symphony in D, which he wrote in 1801, and of which he made three entire scores before he was satisfied to dismiss it. In regarding the productions of this epoch, we must notice the strikingly original conception of the *scherzo*, which first appears in the Septet and in the Symphony in C; besides this they present little that is individual to our master beyond their excellence, which is, however, such as to rank them with the greatest things that had preceded them. This fact is a powerful illustration of the truth that originality consists, not necessarily in an exceptional habit of thought, but may be progressively developed from external impressions, which, in the case of Beethoven, were the seeds that ultimately ripened into the most original individuality that has ever appeared in music.

Beethoven was of a most inflammable nature, and is reported to have entertained as many ardent passions as he met with objects to inspire them. The Countess Giulietta di Guicciardi, to whom he dedicated the "Sonata quasi Fantasia," in C sharp minor (often called the Moonlight Sonata) made the deepest impression on him; three most passionate letters of intense feeling to her still exist. She it was who, in 1801, lured him for a time back into society, from which the embarrassment of his deafness had already exiled him, who gave him renewed confidence in himself and reliance on the world around him; who was his constant object of most anxious interest, his constant source of brightest inspiration.

In 1802 he had a severe illness, that left him in one of those fits of deep despondency to which, without such additional aggravation, his isolated situation rendered him subject. In this depressed state he wrote a will, pathetically

expressed, bequeathing all his possessions to his brothers, and exhorting them to deal tenderly with his memory, urging his infirmity in extenuation of the eccentricities with which they habitually reproached him.

In April, 1803, he produced the "Mount of Olives." Bernadotte, then ambassador at Vienna, suggested to Beethoven in the course of this year the composition of a grand instrumental work in honour of Napoleon. His republican feeling caught fire at the proposal, and he entered upon the task with the determination to produce a masterpiece that should stand in art as its hero then promised to stand in history—the sun of a system. He spent the greater part of a year upon the composition. The noblest and best that belongs to music characterizes this colossal effort, and if the greatness of Beethoven as an artist were to be epitomized in a single work, this work would represent it all. The completed score was about to be forwarded to the first consul, the title-page was headed "Buonaparte," at the bottom of the leaf was written "Luigi van Beethoven," and the author was considering the form of words that should link these extraordinary names, when he learned that Napoleon had assumed the crown of empire. Enraged at this as though at a personal grievance, he tore the intended title-page in pieces, threw the manuscript upon the ground, and would not for many months allow the work to be named. It was subsequently purchased by Prince Lobkowitz, at whose residence it was first performed; and now it was that it received the title of "*Sinfonia Eroica*," with the superscription "*Per festeggiare il sovvenire d'un grand' uomo*."

His next great work was the opera of "*Fidelio*," which was produced in November, 1805, but seven days after the entry of Napoleon's troops into Vienna. It fell flat, for the audience, almost exclusively French and military, neither understood the language nor cared for the music. Fortunately for art the English theatrical custom of regarding original non-success as total failure prevailed not in Vienna, and the opera was accordingly reproduced in March, 1806, and well received; but in consequence of disputes between the composer and the manager and singers it was again laid aside after three representations; in the interim, since the first production, the great overture in C (known by the name of "*Leonore*"), as well as the second overture (Op. 139), which is a sketch for this, had been written, and it was with this grand composition that the opera was reproduced. Afterwards, by the request of Prince Lichnowsky, Beethoven composed the fourth overture (that in E, known by the name of "*Fidelio*"), reduced the opera from three into two acts, changed its name to "*Fidelio*," by which name indeed it had always been known, against the wish of the composer, who preferred "*Leonore*," and in this altered form reproduced it in 1807, to meet with that success which has stamped it as a classic of the lyrical stage. In this marvellous work the text to almost every word has its meaning illustrated in the music. This quality, which induces the very perfection of "*Fidelio*" as a work of art, has had the baneful influence upon recent productions of suggesting a corrupt style, in which the principles of composition are sacrificed to the pretence of expression, and music ceases to be music to become mere declamation. Whoever would exalt this style by referring it to the opera under consideration must be insensible to the technical beauties of that work, which transcend even the beauty of its expression, and forget that means are essential to an end. In 1806 Beethoven wrote the Symphony in B flat, and in the years following the final production of "*Fidelio*," he wrote successively that glorious manifestation of will and power, the Symphony in C minor, and that musical idyl which truthfully tells us how deep was his love of nature, the "*Sinfonia Pastorale*."

In 1809 Beethoven was offered the appointment at Cassel of kapellmeister to Jerome Bonaparte, king of West-

phalia, with a salary of 600 ducats and an equipage; but so highly was his merit prized that the Archduke Rudolf, Prince Lobkowitz, and Prince Kinsky subscribed together to pay him an annual pension of 4000 florins, with the condition, which he accepted, that he should not hold an office out of the Austrian dominions. In 1810 the Mass in C was brought out, its first performance being in the chapel of Prince Esterhazy. At this time, when he went his daily walk round the city, through all weathers and in all seasons at the extreme of speed, fulfilling in his wild appearance all that can be imagined of a state of inspiration, the people stood aside to let Beethoven pass, in reverence of a greatness they appreciated, though they might not understand. Bettina von Arnim about this time was the medium of his first communication with Goethe, as a tribute to the greatness of whom he now wrote the splendid music for Egmont. One of the Pianoforte Concertos (that in E♭), and the remarkable Choral Fantasia are productions of this time, all presented, together with the "Mount of Olives," to an institution for the poor—their generous author absolutely refusing any payment.

In 1814 we have another and a still more romantic symphony, that in A, generally regarded as inaugurating the third style of the master. In 1815 Mr. Neate, the pianist, on behalf of the Philharmonic Society of London, obtained from Beethoven three unpublished overtures, paying him seventy-five guineas for the right of performance until they should be printed. These were the "King Stephen," the "Ruins of Athens," and the "Op. 115." The death of his brother Carl in November, 1815, was an event of the most serious consequence to the rest of his life. Carl left a son of about eight years old, over whom he, by will, appointed Beethoven guardian. The pecuniary responsibility thus imposed upon him was, however, matter of little consideration compared with the happiness he anticipated from finding in his foster son a being who would devotedly love him, and so fill up the blank in his heart, of which his disappointed longing made him but too conscious—a being upon whom he might pour the fulness of his power of affection, and believe it to be reciprocated. The first evil of his new relationship, which was in fact the origin of all its sad consequences to him, was a contention with his brother's widow, an unworthy person, who, as a mother, claimed a right over her child. This was referred to a legal tribunal, and the suit was not decided in confirmation of the father's will until January, 1820. With imprudent fondness he gave the boy unbounded indulgence; and his entire course of management was one series of mistaken good intentions. The lawsuit ended, the youth was placed at the university, where he was publicly disgraced for his misconduct. Harassed by his irritated uncle's reproaches he made an attempt upon his life, for which he was imprisoned as a criminal. The powerful friends of Beethoven enabled him to obtain his nephew's release, and to procure for him a commission in the army. His anxieties for this unhappy young man ceased only with his own life, and the bitter anguish he endured at the disappointment of the doting hopes he had centred in him was the greatest grief he ever had to suffer. His last act in discharge of the duties he had assumed towards him was to make this nephew his sole heir; though in his last moments, as throughout their entire connection, the neglect he experienced was wanton, as the kindness he lavished was profuse. This melancholy train of events yields abundant illustrations of his generous, impetuous, loving, suspicious, and exacting character, the faults of which were exaggerations of virtues, or natural results of his terrible infirmity of deafness. To add to the vexation of the last dozen years of his life the pension settled upon him was reduced, first by an alteration in the funds, then by the death of Prince Kinsky, and still further by the ruin of Prince Lobkowitz, so that for long he received only the portion subscribed by his illustrious pupil and munificent

friend, the Archduke Rudolf, and that diminished in value by the change in the currency. He became extremely anxious about money matters—anxious to the extent, far beyond what the occasion justified, of dreading the approach of beggary; so we find him in his letters speaking of “writing for bread,” and representing himself as fallen into the greatest extremity; whereas the price he received for his works was now at least fourfold what it had been at the beginning of the century. He had as many commissions as he could execute, and, what is most of all satisfactory, there is no evidence of his ever knowing anything more of want than the fear of its coming. He received successive invitations from our Philharmonic Society, upon the most liberal and advantageous terms, to visit this country and direct the performance of some of his works. These proposals were especially attractive to him, as irrespective of the emolument he was always desirous to see England, the country whose constitution, laws, and institutions made the nearest approximation to his ideal of government. Despite the cares by which he was surrounded, imaginary and real, he now concentrated himself upon his art with greater intensity than at any previous time; he produced his longest and most elaborate compositions; he worked at these with unremitting ardour, and he suffered no consideration of popular success or extrinsic effect to interfere with the great internal purpose each was to embody. In 1817 he wrote the Symphony in F, that type of freshness, independence, determination, gaiety, and humour; and while the annoyances of his contention with his brother's widow were at their height he produced the great Pianoforte Sonata in B flat (Op. 106), one of the most profoundly thoughtful and deeply considered of all his works. The Archduke Rudolf, who (except Ries) was his only settled pupil after his early youth, was in 1819 appointed Archbishop of Olmütz, and Beethoven purposed to make a worthy acknowledgment of all the obligations he owed by composing a Mass, to be performed at his inauguration. He was in unusually robust health when he began the gigantic Mass in D, and he proceeded vigorously with his labour until he had sketched to the end of the Credo; but now he became fastidious, and repeatedly laying aside the work, to return to it after careful reflection, he protracted its progress to such an extent that the occasion for which it was designed was come and gone before the composition neared its completion. The incentive to immediate application thus removed he now continued the work for its own sake, and becoming ever more severe in his self-criticism upon it, its conclusion seemed to grow ever more distant. In the summer of 1822, after the germination of three years, this ceaseless subject of his thoughts attained its maturity, and he regarded it always afterwards with such a fondness as could only spring from the peculiar circumstances of its production. This most extraordinary composition owes to those very circumstances which endeared it to its author the qualities that render it inaccessible to general comprehension—its profound æsthetical purpose and its excessive technical elaboration. It is perhaps the grandest piece of musical expression that art possesses, and it abounds in passages of such lofty beauty as is nothing short of sublime—the rendering of the “Passus” and the “Judicare” for example, and the tenor and alto recitatives in the “Agnus;” but its difficulty makes it almost impossible of execution, and its length makes it wholly unavailable for ecclesiastical purposes. Its performance then can only, under the most propitious conditions, take place in the concert-room; and thus, in respect of fitness for its object, it is a colossal failure; but its gigantic merits are equal to its proportions, and it will ever be regarded with reverence, even where it cannot be accepted with faith. In the intervals of the composition of the Mass in D he wrote some remarkable pianoforte sonatas and other smaller works. The greater part of the year 1823 was occupied in the composition of

the Choral Symphony, the work which for grandeur, pathos, fantastic vivacity, and the ultimate development of an idea, and in all these for intensity and power, better represents the fully-matured genius of the master, in its greatness and its individuality, than any other. The Symphony has been more the subject of commentary than all the other productions of Beethoven. It is a work of paramount importance. At a most memorable concert at the Kärnthnertheater, 7th May, 1824, the Overture in C (Op. 124), the Kyrie, Credo, and Agnus from the Mass, and the Choral Symphony were performed. Umlauf, with Beethoven by his side to indicate the tempos, conducted the orchestra, and the theatre was crowded to excess. The applause at the conclusion was tumultuous; but this gave occasion to an incident perhaps the most pathetic in the whole history of art. He whose renown had called the multitude together, he whose genius had kindled the general enthusiasm, stood in the midst insensible to the sounds that stimulated the delight of all around him, insensible to the vociferations that expressed it, until Sontag and Ungher, who had been singing the principal parts, turned his face towards the public, and proved by the waving handkerchiefs and the universal motions of excitement, to his organs of sight, the genuine triumph of which his ears refused him testimony. The pealing cheer this spectacle drew from the very hearts of all who witnessed it penetrated even Beethoven's deafness, and he must have quitted the scene with the consciousness of having set the seal upon his immortality.

He now proposed to himself a series of grand orchestral works; but he was prevented from entering upon this design by the application of Prince Nicolas Galitzin for three violin quartets, of which, for the consideration of seventy-five ducats, he was to have possession for a year before they were published.

An opera and an oratorio were all projected, and their subjects selected, and a mass was commissioned for the imperial chapel. Another great work for a considerable time occupied his thoughts, and he advanced so far with it as to make, according to his wont, many sketches of the chief ideas and their development; this was a tenth symphony, to the composition of which he had been urgently pressed by our Philharmonic Society, and to which the earnest attention of his last moments was applied. His latest finished composition was the last movement as it is printed of the great Quartet in B flat, which he wrote at the request of Artaria the publisher, in substitution for the fugue (Op. 133), that originally formed the conclusion of this extensive work.

To state succinctly his estimation of other musicians, of which time has shown the justice, it may be said that he ranked Handel pre-eminent, but loved the works of Mozart, and revered those he knew (probably a very small proportion) of S. Bach; he spoke slightly of Rossini, thought highly of Schubert, and greeted Weber with a cordiality that proved his admiration.

His habits were to rise early, to write till dinner-time in the middle of the day, to walk for some two hours, during which he arranged his thoughts, and to extemporize on the pianoforte or violin till he went to bed, which was seldom later than ten o'clock. The catalogue of his numbered works reaches to Opus 135, and there are many not numbered. Though disorderly in his dress he was excessively cleanly in his person; and however ill-regulated, his household was frugal. His last illness fell upon him in the autumn of 1826; it soon proved to be dropsy; he suffered immensely, and was tapped three times. His groundless fear of poverty caused him during this period extreme anxiety, under which he wrote, through Moscheles, to our Philharmonic Society, requesting pecuniary assistance; and to the lasting honour of this institution be it recorded, the first return of post carried him an order for £100 sterling. This reached him but a few days before his death, but he

had no occasion for its use; and on his decease there were found among his effects some bank shares, which, added to the sale of his effects, realized nearly ten times the amount. He was only fifty-six years old at his death.

He was interred at the Währing Cemetery, Vienna, with great solemnity, all the musicians of the city assisting in the funeral rites, which were witnessed by a concourse of many thousand persons. Thus the utmost honour was paid to his mortal remains; the homage of all time is due to his immortal memory; and this tribute of the generations his genius has enriched is paid with ever-increasing willingness, as the extending knowledge of his works enlarges the appreciation of their greatness in the heart-throbs that vibrate with the impassioned strains of his creation. Beethoven's Letters, Nohl (trs. Lady Wallace, 1866); his executor Schindler's biography; and the "Lives" by Lenz, Nohl, and above all by Thayer (Berlin, 1866-88), are the principal works on the life of Beethoven. The Beethoven critical literature is enormous. Thayer and Nottebohm's "Catalogues" are the most important.

BEETLES (Coleoptera—Gr. *koleos*, sheath; and *pteron*, wing) are four-winged INSECTS whose first pair of wings are modified into wing-covers or sheaths. As is the case with all insects, the body of the beetle is composed of three principal parts—the head, the thorax, and the abdomen.

The head is composed of several segments. The mouth is uniform, well developed, and adapted for mastication. It consists of an upper lip (*labrum*), a pair of strong jaws (*mandibles*), the second pair of jaws (*maxillæ*), each bearing a jointed organ (*palpus*), a lower lip (*labium*), carrying a pair of *palpi*. There are two eyes, composed of an immense number of lenses arranged closely together, in the form of hexagons, with two antennæ, varying exceedingly as to length, size, form, and appendages, but generally eleven-jointed. The thorax consists of three segments, *prothorax*, *mesothorax*, and *metathorax*. The *prothorax* bears the anterior pair of legs, the *mesothorax* and *metathorax* the intermediate and posterior legs, the wing-covers, and the wings. The wings are usually four in number; the upper wings (*elytra*) are stiff, horny, or coriaceous; they cover the true membranous wings, which when at rest are neatly folded up beneath them; they are not agitated in flight, but by their expansion give increase of surface, without adding to weight. In some species of *Carabus* the under or membranous wings are wanting or merely rudimentary, and in some of these instances the *elytra* are soldered together, being useful only as armour to protect the abdomen. These insects are incapable of flight. The *elytra* differ greatly in form, smoothness, vlosity, and striations.

In some cases, though rarely, the females have neither wings nor wing-covers. When the *elytra* are closed, the only parts of the thorax visible from above are the *prothorax* and a small plate (*scutellum*) belonging to the *mesothorax*. There are three pair of limbs formed for running, burrowing, leaping, swimming, or slow heavy progression, and therefore much diversified in form. Yet, however variable in form, a limb may be divided into five principal parts:—1, the *coxa*, or hip, joined to the *thorax*, where it plays in a socket; 2, the *trochanter*; 3, the *femur*, or thigh; 4, the *tibia*, or shank; and 5, the *tarsus*, never composed of more than five joints, often of a less number, and generally terminated by two hooked claws.

The abdomen is generally covered by the *elytra*, but by no means always so. In many instances these *elytra*, or wing-covers, are very short, and in some the membranous wings even are not protected by them.

All beetles undergo a metamorphosis before maturity is attained, but the larvæ differ greatly in their habits and form. Some live underground, feeding upon roots; some live in the trunks or the bark of trees, feeding on the decaying wood; some feed upon excrementitious matters; some upon leaves, others upon shelled fruits. In some

cases the larva is a mere footless inactive maggot; in some species, except that it has no wings, it resembles the perfect insect; in other species it is totally unlike the perfect insect. The body of the larva generally consists of thirteen distinct segments, the head being included. The true legs are six in number (three pairs), a pair to each of the three segments next to the head; they are small, and usually terminated in a simple claw. Sometimes, in addition to these, they are furnished with false legs (*pro-legs*), which the animal can protrude at pleasure. Some larvæ have only two of these pro-legs attached to the terminal segment of the abdomen. In all cases there is a distinct head, which is horny and furnished with a masticatory mouth. The pupa is always inactive, and is covered by a skin, through which may be seen distinctly the parts of the perfect insect. Those larvæ that live in the ground generally prepare for the pupa state by removing the soil that surrounds them so as to form an oval chamber; others envelop themselves in a sort of cocoon, formed of particles of earth, &c., joined together by a kind of web or glutinous substance. Wood or bark feeding larvæ mostly assume the pupa state without such preparation. Some larvæ which feed upon plants inclose themselves in a cocoon; others again suspend themselves by the tail, and hang from a stalk or leaf of the plant on which they fed.

The beetles are usually arranged into sections according to the number of joints in the *tarsus*. Four sections are recognized:—1, TRIMERA, in which the tarsi have three joints; 2, TETRAMERA (see Plates, BEETLES, figs. 27, 29-32), in which the tarsi have four joints. But in both these sections a minute additional joint is frequently found. 3, PENTAMERA (see Plates, BEETLES, figs. 1-26), in which the tarsi have five joints; 4, HETEROMERA (see Plates, BEETLES, figs. 28, 33-38), in which the tarsi of the two anterior pair of legs have five joints, those of the posterior pair only four joints.

Beetles are world-wide in their distribution, and numerically they form the largest zoological order. It has been estimated by a competent authority that while there are 80,000 species which have been described, the total number existing in nature must reach at least 100,000. Three thousand species have been described which belong to England alone, and amongst these "we find," says Staveley in "British Insects," "inhabitants of the land and of the water, dwellers on the earth and under the earth; we find scavengers and sextons, fierce hunters and sluggish vegetarians, and, strangest of all, we find a servile race content to live in captivity and minister to the needs or luxury of another tribe of animals."

Fossil beetles are found for the first time in the carboniferous rocks, and they are well represented in the Jurassic formations.

BEFFANA, a corruption of Epiphania, is the name given in Italy to a mythical old woman who is supposed to take a great interest in the behaviour of young children. The tradition as to the way in which she acquired this character is rather curious. It is said that being a most industrious housewife, she was engaged in cleaning the house when the three wise men from the East went by on their way to the infant Christ. Being invited to go out to see them pass she declined, on the ground that she was too busy just then, and that she could see them as they came back. As they returned another way she has ever since been looking out for them in vain, and as they went to carry gifts to the infant Christ she does something similar to young children. On Twelfth Night the younger members of the family are put to bed early, and a stocking of each is hung before the fire, into which she is supposed to put a present, the value of which depends upon the conduct of the child during the previous year. Where it is designed to express disapprobation the youngster finds the stocking full of ashes, and in consequence the Beffana is

used by nurses and parents as a name of awe to impress children when naughty. Compare with SANTA CLAUS.

BEFFROI or **BELTRY**, a wooden tower, used in ancient and mediæval times in besieging walled cities. It was built in stages which communicated with each other by ladders, and was furnished with a hinged drawbridge at the top, which being let down upon the wall enabled the storming party to pass to the attack. It was usually erected at a point beyond the reach of the missiles of the besieged, and then pushed forward upon wheels to the wall assailed. A tower of this description was erected by the Royalists during the wars under Charles I. in England, but was not actually brought into use.

BEGGAR, one who lives by asking alms of the public at large. People of this class have been found in all civilized and uncivilized nations from a very early period, and they exist in immense numbers at the present day. In many parts of the world the beggars form a powerful and dangerous class of society, and extort the means of their support more from the fears of the rest of the community than from sympathy or pity. In China, for instance, begging is a regularly organized trade, has its rules and leaders, and is worked in a most complete and systematic manner. Each town is divided into districts, and a rate is levied upon each shop, which is collected daily and a ticket given as a receipt. When this is paid readily the ticket serves to protect the shopkeeper against other demands; but should a man refuse to pay, the beggars combine to annoy him, and by coming in one after another, and making a din so as to prevent business generally, succeed in forcing him to come to terms. In Europe beggars are to be found in every country, but are most numerous in Spain and Southern Italy. There are also large numbers of professional beggars in England, and much that is curious and interesting concerning their customs and habits has been discovered of late years by inquirers who have devoted themselves to the study. At the head of the profession are the begging-letter writers, many of whom are possessed of considerable ability, and succeed in gaining large sums by this mode of appeal. Others obtain an idle livelihood by means of sham collecting-books, subscription lists, &c., and these also have been known to gain some hundreds of pounds in a year without detection. Large sums comparatively are also made by beggars who go from door to door in the streets of the large towns, and by those who take a stand in a public road, or who waylay people in the more retired streets. It has been found that the children of these people generally follow the same practices, and families have been found in which it was a boast that for two or three generations the members had "never done a day's work in their lives." As might be expected, it has been found that the professional beggar and the habitual criminal are closely allied. They generally live together in the same houses or neighbourhood, and in most of the large towns such quarters, with their inhabitants, are well known to the police, who are thus somewhat assisted in their efforts to arrest those members of the criminal class who have been detected or informed against.

It is unnecessary to adduce arguments to show that indiscriminate alms-giving is a very clumsy, inefficient, and dangerous mode of relieving distress, and one that very often proves hurtful both to the giver and the recipient, but it is not easy to see how it can be suppressed. The present modes of distributing official relief to those who deserve it, and of restraining mendicancy by the imposition of labour, &c., do not possess that support from public opinion which is necessary to make them effective; and until they have been improved so as to enable the instincts of charity, encouraged by religion, and the necessary conditions of political and social economy to work harmoniously together, it is probable that begging, either open or secret, will continue to exist.

BEGGARS, THE LAW OF ENGLAND RELATIVE TO. By the Vagrant Act, 5 Geo. IV. c. 83, beggars are divided into three classes. The first are those who wander abroad or place themselves in any public place to beg, or who employ any child or children to do so, and who are termed *idle or disorderly persons*. These, if brought before a justice of the peace or magistrate, may be committed to prison or to the house of correction for any time not exceeding one calendar month. The second class consists of such persons who have been previously convicted of begging and have offended again, together with such as expose wounds and deformities, obtain money by fortune-telling or any other false pretence, or who are found loitering with housebreaking tools in their possession. These are termed *rogues and vagabonds*, and are liable to imprisonment with hard labour for any period not exceeding three months. The third class is that of the *incorrigible rogues*, i.e. such as have been previously convicted as rogues and vagabonds, or who have escaped from prison without completing their term of punishment, or who offer violent resistance when arrested. These are liable to a year's imprisonment.

BEGHAR MI or **BAGHER MI** is a country in Central Africa lying to the S.E. of Lake Chad, between Bornou on the W. and Dar-Zuleh or Wadai on the E. It extends southward to about lat. 10° N. From the swampy southern shores of the Chad the country rises imperceptibly for a considerable distance, and then the surface begins to swell into hills which by degrees attain the height of mountains. The hilly and mountainous portion of it belongs to Begharmi. The greatest part of the country is covered with thick forests, chiefly inhabited by the ferocious animals common in this part of Africa. It is also traversed by a great number of rivers and water-courses, and contains numerous lakes. The river Shari, which forms the natural boundary between Begharmi and Bornou, enters the level country as a considerable stream, being at Kuseru about 1200 feet wide. Negro millet, sesamum, and sorghum are the principal grains cultivated. Rice grows wild, and several kinds of grass or *poa* are used as food by the natives. Cotton and indigo are grown, chiefly by Bornou immigrants. The country often suffers from drought, and is plagued with worms and insects, especially ants of all kinds. The feet of many of the inhabitants are mutilated from the attacks of a small worm which takes up its residence in the first joint of the little toe and eats it away. The inhabitants are distinguished above other negro nations for their bravery and industry; but from the numerous deserted villages which the traveller constantly sees, they appear to have formerly been much more numerous than at present. The capital of Begharmi is Masena, described by Barth, who was detained there as a prisoner, as having a circumference of 7 miles; and the population of the whole region is estimated at 1,500,000.

BEGONIA CÆÆ is an order of **MONOPETALÆ**, composed of species found exclusively in the dampest parts of the tropics in both the New and Old World, particularly in Asia and America. There are two genera, *Begonia* and *Hillebrandia*. The latter is a native of the Sandwich Islands, and there is only one species, whereas there are no less than 330 species of *Begonia*.

The *Begoniaceæ*, or elephant's ears, are herbs, or low succulent shrubs, with alternate fleshy leaves, oblique at the base, and often richly covered with crimson, the neat-looking pink flowers growing in few-flowered panicles. They are deservedly favourites with the collectors of tropical plants, in consequence of the facility with which they may be kept in a state of almost constant flowering. Heat and moisture in a high degree, with decayed vegetable matter to grow in, such as old tan, are all that they require. The flowers are monœcious, with sepals generally coloured, and stamens and petals perigynous. The ovary

is inferior, three-celled, with the ovules attached from the angles of the cells in the centre.

BÉGUINS, BÉGUINES. The Béguins were certain tertiary or half-monks, who followed the rule of St. Francis as to dress. They were called in Italy Bizochi, in France Béguins, and in Germany Beghards. The Bizochi, or Béguins, if we except their mean clothing and certain observances or maxims which they followed in consequence of the injunctions of St. Francis, lived after the manner of other men, and were therefore considered in no other light than as seculars and laymen.

We must not, however, confound these Béguins and Béguines with the German and Belgic Béguines (Flemish, *Beggyn*), who crept out of their obscurity in the thirteenth century, and multiplied prodigiously in a very short time. (The derivation of their name is uncertain. It is thought to come from *St. Begga*, mother of Pepin l'Heristal.) A certain number of pious women, both virgins and widows, formed themselves into societies, each of which had a fixed place of residence, and was under the inspection and government of a female head. Here they divided their time between exercises of devotion and works of industry, reserving to themselves the liberty of entering into the state of matrimony, and quitting the convent whenever they thought proper. The first society of this kind that we read of was formed at Nivelles in Brabant, in the year 1226, or, as other historians say, in 1207, and was followed by so many institutions of a like nature in France, Germany, Holland, and Flanders, that towards the middle of the thirteenth century there was scarcely a city of any note that had not its *béguinage*. These institutions are still to be found in various parts of Belgium and Holland, and numbered about twenty in 1883. The two largest were formerly in the city of Ghent, but in 1875 the inmates of the Grand Béguinage migrated to a new site without the town, where in a large community of 700 souls they occupy eighteen convents and many streets—the whole colony being planned by the architect Verhaegen—still retaining the principal peculiarities of the old *béguinage*. They were, so to speak, small inclosed villages within the city bounds, and contained from 100 to 120 houses, some of which were tolerably large, but the majority were small and calculated to accommodate only three or four inmates. The small *béguinage*, with about 300 inhabitants, still remains in the midst of Ghent.

Single women or widows of any rank, from girlhood up to the age of forty-six, are admitted, but their vows are only taken from year to year. The circumstance that one of their rules is to speak Flemish among themselves and French to strangers, indicates that Flemish women were the first of the order. Their vows, besides being limited in duration, are but two in number, i.e. chastity and obedience; poverty being so little contemplated in the system that each Béguine provides her own food, and is required to have a clear annual income of at least £10. The entrance fee is about £3, and this sum entitles the Béguine to a share for life in all that the house contains. The same is paid towards the services of the church, but this is returned in the case of leaving the place. Many of the inhabitants are of good family, some are exceedingly wealthy, and give away largely in promiscuous charity. Those who are poor are at liberty to increase their income, and do so in various ways. They do much fine needlework, which they sell; they repair lace, cambric, &c., with amazing skill, and make a great deal of Mechlin, Valenciennes, and old point lace. They distil and dispense medicines, make liquors and preserves, act as attendants to the richer Béguines, and as sick-nurses to all who seek their services; and for this purpose they are in very great request, owing to their well-known qualities of patience, probity, cleanliness, and habits of obedience. As teachers of young children they are said to be very successful. Persons may visit them up to night-fall, when the gates are closed to all but actual members.

Of course there is daily mass, and those who desire it may be as devotional as they please; but no great stress appears to be laid upon them in this matter, and as the chapel stands apart from the houses there is the less temptation to practise excessive austerities. The costume worn is black, and on fête days blue, so that the Béguines are easily distinguished. ("The Beggynhof, or the City of the Single," London, 1869.)

BEHAR, one of the four great provinces which make up the Lieutenant-governorship of Bengal, the remaining three being Bengal proper, Orissa, and Chutia Nagpur. Behar lies between 23° 49' and 27° 29' N. lat., and between 83° 22' and 88° 35' E. lon., and comprises the ten districts of Patna, Saran, Gaya, Shahabad, Tirhut, Champaran, the Santal Parganas, Bhagalpur, Monghyr, and Purniah. The area of the province is 42,417 square miles, and the population 20,000,000.

The country generally is flat, except in the district of Monghyr, where detached hills occur, and in the south-east of the province, where the Rajmahal and Santal ranges abut upon the plains. The highest hill is Moher (1620 feet), in the Gaya district; the range in the Santal Parganas varies from 800 to 1600 feet. The great river of the province is the Ganges, which, entering at Buxar and leaving at Rajmahal, divides the province into two almost equal portions. Both are watered by large tributaries of the Ganges, the chief being the Gogra, the Gandak, the Kusi, the Mahanada in the north, and the Son in the south.

BEHAR, a town on the Panchana river, and the headquarters of a subdivision of the same name in the Patna district, Bengal, has a population of 45,000. Considerable trade is carried on. All the traffic between Patna, Gaya, Hazaribagh, and Monghyr passes through Behar, and travelling traders offer their goods for sale as they pass. Silk and cotton cloths, and muslins rivaling those of Dacca, are manufactured. The most remarkable building in Behar is a large *sarai*, or inn, built for the use of Hindu and Mohammedan pilgrims. The tomb of Shah Mukhdum, on the south bank of the river, is resorted to by about 20,000 Mussulmans once a year, a large fair being held on the occasion. There are several other tombs in the city, which also contains numerous ancient mosques, and the ruins of an old fort covering more than 300 acres of ground. The city is supposed to have been the capital of the ancient kingdom of Magadha, soon after the commencement of the Christian era, but its early history is involved in obscurity.

BEHEM, MARTIN, was a celebrated navigator and geographer of the fifteenth century. He was born at Nürnberg about the year 1436. His education was carefully attended to, and he is said to have enjoyed the advantage of being instructed by the learned John Müller, better known under the Latin name of Regiomontanus. In early life he followed the profession of a merchant, continuing, however, to cultivate the mathematical, and particularly the nautical, sciences.

Behem went to Portugal in 1479, where, as a skilful cosmographer and maker of maps, he was well received, that country being at the time wholly given up to maritime discoveries, and in 1484 was placed as a scientific man on board the fleet of the celebrated navigator Diego Cam, who was commissioned to prosecute Portuguese discovery along the West African coasts. After an absence of nineteen months, Behem returned to Lisbon, where, in reward for his services, the king (John II.) conferred the honour of knighthood upon him in a public and unusually splendid manner. He afterwards visited the Azores, and resided there many years. He died at Lisbon in 1506, leaving no works of any kind behind him, except the maps and charts he had made, and a terrestrial globe.

It is admitted on all sides that Martin Behem ought to be regarded as one of the most learned geographers, and as

the very best chartmaker of his age; but the theory which has been advanced by certain writers, that he and not Columbus was the real discoverer of America, has no foundation whatever.

BEHEMOTH occurs in Job xl. 15-24, as the name of a large horribivorous animal. It may be the plural of Hebrew *behemah*, "a beast;" but is more probably a Jewish form of the Egyptian *pe-he-mont*, "water ox," that is, hippopotamus.

BEHISTUN or **BISUTUN**, a precipitous mountain or rock in the province of Irak-Ajemi, in Persia, remarkable for the extensive inscriptions, with sculptures, of a very early date still presented on its surface. The place is alluded to by Greek and Roman writers; but it was reserved for Sir H. Rawlinson, in 1846, to decipher the inscriptions, which he refers for the most part to the time of Darius Hystaspes (516-515 B.C.).

BEHRING, VITUS, was by birth a Dane, and in his youth made many voyages to the East and West Indies. He early entered the navy of Russia, and served in the Cronstadt fleet in the wars with the Swedes. He quickly obtained promotion, and the Empress Catherine being anxious to promote discovery in the north-east quarter of Asia, and to settle the then doubtful question as to the junction of Asia and America, Behring was appointed to command an expedition for that purpose. He left St. Petersburg in February, 1725, travelled overland to Nischnei Kamchatka Ostrog, where he built a small boat, and sailed on the 20th of July, 1728, coasting Kamchatka till he reached in August (67° 18' N. lat. by his observations) a cape which, from the land beyond it trending so much to the westward, he erroneously supposed to be the north-eastermost point of Asia. In 1733 he took the command of an expedition for the purposes of discovery, which was fitted out on a very large scale. He stationed himself at Yakutsk, directing various detachments of his officers down the rivers on different points of the Frozen Ocean. In 1740 he reached Okhotsk, where vessels had previously been built for him, in which he sailed for Awatska Bay, where he founded the present settlement of Petropaulovski, and passed the winter. He left Awatska in June, 1741, steering first to the south-east and then to the north-east, and on the 18th July, after having been forty-four days at sea, he descended very high mountains covered with snow in 58½° N. lat., having made, according to his reckoning, 50° of E. lon. from Awatska. He now resolved to return to Kamchatka, which, however, he was not doomed to reach. Having passed several islands, his ship was wrecked on that which now bears his name, on the 3rd November, 1741; and Behring died on the 8th December. In the following summer the survivors of his crew reached Kamchatka in a small vessel which they built from the wreck, and thus some account of this ill-fated voyage was preserved.

BEHRING'S ISLAND, the most western of the ALKUTIAN group, is situated in the North Pacific, 100 miles E. of Cape Kamchatka. It was discovered by Behring on his return to Kamchatka from the voyage of discovery on the coast of America in 1741, and it was here that he was wrecked and died. It was uninhabited at that time, and was barren in the extreme, without a shrub on its surface. It has since become a station at which vessels from Okhotsk and Kamchatka, trading to the numerous islands in those seas, often winter and cure a quantity of the flesh of sea animals for their voyage. The island is high to the N.W., steep and cliffy, but slopes gradually down to the southern shores, which are low. Fresh water is found on it.

BEHRING'S STRAIT, which connects the Pacific with the Arctic Ocean, is formed by the approach of America and Asia; the two nearest points of these continents respectively are Cape Prince of Wales and East Cape which are distant 40 miles from each other. The greatest

depth of water in the strait is about 82 fathoms. About midway across are three small islands, called the Diomedes, either these islands nor the adjacent shores are permanently inhabited, but they are frequently visited by the esquimaux. The strait derives its name from Vitus Behring, who discovered it in 1728. It was visited and thoroughly explored by Cook in 1778.

BEYCOS BAY. This bay is in the Bosphorus, between the Sea of Marmora and the Euxine, and was the rendezvous of the French and English squadrons after their commanders had received orders to quit Besika Bay, outside of the Dardanelles, in October, 1853. They remained in this anchorage until January, 1854, when, owing to the outrage of Sinope, they were ordered into the Black Sea.

BEYRA. See **BEYRA**.

BEIROUT. See **BEYROUT**.

BEIT is an Arabic word, which properly signifies a tent or hut, but is likewise employed to denote any edifice or bode of men.

BEITH (Gaelic, "birch-tree"), a town in Ayrshire, Scotland, is beautifully situated on a rising-ground about a mile E. from the Beith station on the Glasgow and South-western Railway. A very extensive trade in linen and new yarn was at one time carried on here. There are at present a linen thread factory, a silk printing and dyeing establishment, tanneries, and cabinet works. A great horse fair is held every year in August, on a day called "Tenant's"—a corruption of St. Inan's Day. The population in 1881 was 4037—an increase of 330 over 1871.

BE'JA (the *Pax Julia* of the Romans), a town in Portugal, in the province of Alentejo, 36 miles S. of Evora. It is built upon a rock of granite, and is almost circular, and surrounded by walls of Moorish and Portuguese construction. It is the seat of a bishop, and of the civil authorities of the district, and contains 7000 inhabitants, many of whom are engaged in the breeding of cattle. There are a gate and an aqueduct of Roman construction at Beja.

BEJAPPOOR. See **BIJAPUR**.

BEL AND THE DRAGON, an apocryphal addition to the Book of Daniel, found in the Greek versions of the Old Testament, but wanting in the Hebrew original. In the Septuagint it is entitled "Part of the Prophecy of Habakkuk." The origin of the story and its design are alike unknown. It seems to be a very ancient Babylonian legend, and recent discoveries considerably support its authenticity. The book contains also a second version of Daniel in the Lion's Den, and his delivery by the prophet Habakkuk, differing considerably from Daniel vi.

BELEM. See **LISBON**.

BEL'EMNITES is a genus of CEPHALOPODA which occurs fossil from the Trias to the Upper Greensand. They differ from other fossil-chambered shells in having their chambers inclosed within a cone-shaped fibrous sheath, resembling in form the point of an arrow, whence they derive their name.

A belemnite may be described as a compound internal shell, consisting of three essential parts:—First, a fibro-calcareous cone-shaped shell, terminating at its larger end in a hollow cone. Second, a conical thin horny sheath, or cup, commencing from the base of the hollow cone of the fibro-calcareous sheath, and rapidly enlarging as it extends outwards to a considerable distance. This cup-like sheath formed the anterior chamber of the belemnite, and contained the *ink-bag* and some other viscera. Third, a thin conical internal chambered shell, called the *alveolus*, placed within the hollow calcareous cone already described. This portion of the shell is closely allied in form and construction to the nautilus. Thin transverse plates divide it into a series of narrow air-chambers, or *arcola*, resembling a pile of watch-glasses, gradually diminishing towards the apex. Outwardly these plates are concave, and inwardly

convex. A continuous siphuncle, or locomotor tube, runs through all of them.

Every animal was provided, like the modern sepia, with an ink-bag nearly a foot in length. Hence we may conclude that they had an internal shell, the ink-bag being a



Belemnite restored.

defensive provision entirely confined to naked cephalopods. Professor Owen has demonstrated that the animal of which the belemnite was the internal bone, was, in reality, a dibrancheate eight-armed cuttle fish, like the modern genus *Onychoteuthis*.

BELFAST, a maritime town and parliamentary borough, the capital of Ulster, the chief manufacturing town of Ireland, and the county town of Antrim, is situated on both sides of the river Lagan, where it discharges itself into Belfast Lough, an extensive inlet from the Irish Channel. Although noticed in the old histories and topographies of the country as existing so far back as the middle of the twelfth century, the town is, practically speaking, of comparatively recent date. Its name is derived either from the Celtic words, *Beol fearsad*, signifying "the mouth of a ford," or *Beol*, "a mouth," and *fearsad*, "pools of water." The first castle of Belfast was probably built by Sir John de Courcsey shortly subsequent to 1178. The last castle was erected by Sir Arthur Chichester, lord deputy of Ireland (afterwards Baron Chichester of Belfast), early in the seventeenth century, and was accidentally destroyed by fire in 1708, when the three Ladies Chichester, daughters of the third Earl of Donegal, perished in the conflagration. Although long after the time of De Courcsey, Belfast certainly held no higher rank than that of a mere fishing hamlet, in 1816, when sacked by Edward Bruce, brother of the great Robert of Scotland, it was, according to authentic records, one of the many "very good towns and strongholds which he wasted."

The river Lagan, which separates the counties of Antrim and Down, is crossed by three bridges and two boat ferries. The Queen's Bridge, built of granite, on the site of the old "Long Bridge," which had twenty-one arches, is a noble structure. It was opened for traffic in the year 1844, and cost £27,000. Ormeau Bridge was constructed in 1863, and cost £17,000. The process of deepening the natural and artificial channels by steam dredging has been so successfully prosecuted that there is now from Garmoyle, 4 miles from the town, to Queen's Bridge a depth of 11 feet at low water, and 28 feet at high water of average spring tides, admitting vessels of 2500 tons register to moor at the discharging berths.

The docks have been increased and extended during the last few years. The progress both in shipbuilding and shipping is most remarkable, being quite equal to that of any other place in the United Kingdom. Under the exceptional circumstances of Ireland Belfast has shown extraordinary enterprise. A few facts from the best and

most recent official information will be found in this respect interesting and instructive. In 1887, when the first important Act was obtained for the improvement of the harbour, the number of vessels entering the port was 2724, having a capacity of 288,143 registered tons. In 1884 the number was 7821, with an aggregate of 1,570,062 registered tons. The income of the port in the same year was £108,585; the expenditure, which included the interest of a debt of £789,462, was £48,200. There was thus a clear surplus revenue of £15,385 from the harbour in the year mentioned. The principal exports consist of linen goods, yarns, whisky, machinery, cattle, and provisions.

Belfast has in recent years become the seat of an important and rapidly increasing industry in iron shipbuilding. The amount of the shipping launched in 1883 was 41,173 tons. As steamboats have rapidly taken the place of sailing vessels, and iron ships of wooden ships, drawing a greater depth of water, it has been found necessary to deepen the channel and to provide new docks and quays. Hence the Harbour Commissioners in 1882 obtained an Act of Parliament empowering them to borrow £900,000, to carry out several important works. These are to improve and reconstruct certain docks and quays; to form a deep-water quay and dock for Transatlantic steamers; to construct a large graving dock, 800 feet long, for repairing the largest class of steamers; to provide additional yards for shipbuilding; to deepen the present Victoria Channel and extend it in a straight line to the deep water. When these works are finished the largest ocean steamers will be able to use the quays, and to remain afloat in all states of the tide. The principal quay referred to in this Act has been reconstructed; one of the shipbuilding yards has been let to an enterprising firm; the graving dock and the deep channel are in course of construction; and machinery for the rapid discharge of grain cargoes has been provided. The income of the Harbour Trust is principally derived from tolls paid by ships and rates on goods landed at the quays. There are, however, also receipts from graving docks, the supply of ballast, and miscellaneous rents. The commissioners were formerly elected on a very restricted franchise; but in 1883 an Act of Parliament was passed for increasing the number of commissioners, and for reducing the franchise to a £20 tenement valuation. It also embodies those clauses of the Commissioners Clauses Act which provide for multiple voting, the object being, as applied to the docks and harbours of the United Kingdom, to retain in some degree the control of the funds in the hands of the mercantile classes, who are the substantial ratepayers.

The houses in the town are generally built with brick, the streets are regular, and the general appearance is pleasing. There are places of worship for all denominations, three colleges, and a large number of excellent schools. There are several hospitals, a lunatic asylum, a deaf and dumb institution, gaol, county court-house, barracks, linen hall, commercial buildings, corn exchange, museum, Ulster Hall, music-hall, theatre, several club-houses, and the royal botanic gardens, comprising seventeen acres. The Prince Albert Memorial, a handsome tower, richly decorated, surmounted by an illuminated clock, was completed in 1869. In 1871 a very handsome and convenient set of municipal buildings was finished, serving as town-hall, corporation offices, fire-engine station, recorder's and police courts, and a police office with cells and other requisites. In the neighbourhood is Belfast Castle, a magnificent mansion completed in 1871.

Belfast returns two members to Parliament. The town is governed by a corporation elected by five wards, each ward returning two aldermen and six councillors. The assizes for the county of Antrim are held in Belfast, also quarter and petty sessions.

During the last few years a series of improvements, for which an Act of Parliament was obtained, have been carried on by the Belfast Town Council. The town generally, as well as the port, is steadily and rapidly progressing, while so many towns in the south and west of Ireland are stationary or decaying. Public slaughter-houses and baths have recently been erected. Corn Market and Anne Street have been widened under the Belfast Improvement Scheme of 1877. Under the Improvement Act of 1878 a handsome new street, one of the finest in any town of the United Kingdom, has been built from Castle Place to York Street. It is called Royal Avenue, the large majority of the inhabitants of Belfast, in contradistinction to the spirit which prevails in some other parts of Ireland, generally wishing, in the names of their streets and public buildings, to show their loyalty. Another new street, from North Street to Smithfield, has been called after the late president of the United States, Garfield Street. Ormeau Street has been opened up from Bedford Street to Ormeau Road, and Linnen Hall Street, Adelaide, Alfred Street, and Joy Street are respectively to be continued into Ormeau Avenue. The Blackstaff, a river full of impurities, has recently been culverted. But in consequence of defective sanitary arrangements Belfast is not so healthy as, from its openness to the sea and the mountains, it might be made, and the death-rate is exceptionally high. During the last two years 100 new streets have been built. The population is now estimated to be about 220,000. The parliamentary electors are 21,000. The valuation is £610,379. The Town Council have contributed £10,000 to the improvement of the street in front of Donegal Quay, now being carried out by the Harbour Commissioners. It will thus be seen that Belfast is not at all standing still, and that the energy and enterprise of her inhabitants are making themselves felt, not only in Ireland but throughout the kingdom and in many lands.

Belfast is the nucleus of the staple trade of Ulster. There are altogether about forty flax spinning mills and thirty linen weaving factories, containing 500,000 spindles and 8000 looms, and giving employment to 30,000 persons. The damask manufacture is pursued with much spirit and success at the celebrated Royal Damask Factory, Ardoyne. The sewed muslin trade of Belfast, which is next in importance to the linen trade, gives more or less employment to about half a million persons in Ireland, principally females. Other chief branches of industry are cotton spinning, ironfoundry on an extensive scale, and bleaching. There are also print and chemical works, flour, oil, alabaster, and barilla mills, breweries, distillery, tan-yards, patent felt manufactories, &c.; five large ship-yards, with two patent slips, and yards for manufacturing ropes and sail cloth. The magnitude of the manufactures of all kinds conducted in Belfast, and the extensive use of steam-power, render the coal trade one of great importance in the locality. The timber trade is also very active.

The town occupies a commodious position for the purposes of commerce, but the site is low, a large portion of it being land reclaimed from the sea, and only 2 or 3 feet above high-water level. The mean annual temperature is about 50° Fahr., and the average fall of rain 31·96 inches.

The inland trade of Belfast is partly carried on by the Lagan Canal, which connects the town with Lough Neagh, and by a very convenient service of railways to all parts of Ireland. The commerce is of great extent, both with other parts of the United Kingdom and with the United States of America and Canada, the West Indies, Mediterranean, Baltic, and Archangel. The chief articles of export are cotton and linen manufactures, linen yarn, corn, meal, flour, provisions, horses, flax, and tow. The number of vessels registered as belonging to the port in 1884 was 378 (93,276 tons). The entries and clearances each amount to about 9500 (1,850,000 tons) per annum. The customs

revenue in 1884 was £656,215. The improvements which have been made in the port of late years have cost considerably over a million sterling, raised in local loans on the security of the harbour dues.

The following is the population of Belfast since 1821:—

1821,	37,277	1851,	87,062
1831,	53,287	1861,	121,602
1841,	70,447	1871,	174,412
1881,	208,122.		

BELFAST or PORT FAIRY, a seaport town of Victoria, Australia, in the county of Villiers, at the mouth of the river Moyne, 180 miles W.S.W. of Melbourne, to and from which there is regular steam communication. There is also overland communication by coach and railway. Sailing vessels drawing 9 feet of water are loaded and discharged at the wharf stores in the middle of the town. Belfast mainly depends on the fertile well-cultivated farms in the neighbourhood for its support, and there is a considerable trade in wool, grain, and general produce. It is the principal shipping port of the western district. The harbour has been very much improved and the passage deepened and widened in recent years. The town is quadrangular in form. The Tower Hill, a remarkable volcanic mountain, with a perfect extinct crater, standing in the Tower Lake, is 9 miles N.N.E. of Belfast. It is entirely surrounded by water, and is much frequented by sightseers. The population of Belfast in 1883 was 2000.

BELFORT, a town of France, the capital of the territory of Belfort, formerly in the department of Haut-Rhin, 40 miles S.S.W. of Colmar, and 274 from Paris, on the left bank of the Savoureuse, a tributary of the Doubs. In the Franco-German war the town was besieged by the Germans from 8th December, 1870, to 16th February, 1871, and near it an engagement took place on the 15th, 16th, and 17th January, 1871, in which General Werder defended himself in an entrenched camp, with about 50,000 Germans, against an army of 133,000 French under General Bourbaki, who were ultimately compelled to retreat over the Swiss border. The town capitulated on 16th February, 1871, its defenders being permitted to march out with all the honours of war. In the terms of peace subsequently offered the French government had the alternative of either ceding Belfort with the other part of Alsace taken by the Germans, or of retaining the town by allowing a German army temporarily to occupy Paris. M. Thiers preferred submitting to the humiliation of allowing the conquering army to enter the capital, and Belfort was saved to France. Its fortifications have since been considerably strengthened, and a large entrenched camp formed. The great military value of Belfort is that it defends the entrance into France through the opening between the Vosges and the Jura. The population of the town in 1882 was 13,200; of the territory, which has an area of 235 square miles, 74,244.

BELGÆ, the general name given by Cæsar to the different tribes who inhabited the north of Gaul, between the sea on the west, the rivers Matrona (Marne) and Sequana (Seine) on the south, and the Rhenus (Rhine) on the east. Cæsar also uses the term Belgium to express the country of the Belgæ. The Belgæ were, according to Cæsar, of German origin. The Bellouaci [see **BEAUVAIS**] were the most warlike and numerous Belgic tribe in the time of Cæsar. The Belgæ may be described generally as occupying, in the time of Cæsar, the French departments of Nord, Pas de Calais, Somme, Seine Inférieure, Oise, and Aisne, with a part of modern Belgium. When Cæsar invaded South Britain, he found that part of the island occupied by Belgæ—that is, the tribes of German origin.

BELGAUM, a district in the Bombay Presidency, British India, lying between 15° 22' and 16° 56' N. lat., and between 74° 4' and 75° 35' E. lon. The area is 4591 square miles, and the population 950,000.

The country forms a large plain studded with solitary peaks, and broken here and there by low ranges of hills. Many of the peaks are crowned by small but well-built hill forts. The ranges of low hills are generally covered with wild brushwood, but in some cases their sides are carefully cultivated almost to the very summit. The most elevated portion of the district lies to the west, along the line of the Sahyadri Hills, or Western Ghats. The principal rivers are the Kistna (Krishna), flowing through the centre, and the Malprabha, through the south of the district. From their sources among the spurs of the Sahyadri range both these rivers pass eastwards through the plain of Belgaum, on their way to the Bay of Bengal. They are bordered by deeply cut banks, over which they seldom flow. None of the rivers are serviceable for purposes of navigation. Sometimes, in April and May, the heat is extreme, and in June and July the air is close and heavy, but on the whole the climate is equable and pleasant to Europeans. At the close of the rainy season, in the months of October and November, fevers are common, but at other times, except in the wilder or less cultivated tracts near the Sahyadri Hills, the climate is healthy.

Of wild animals the antelope is common, ranging over the black soil plain in herds of from twenty to forty head. Sambar deer, wild pigs, and hyenas are found in the waste and forest lands. Of the larger beasts of prey panthers are pretty generally distributed, but tigers are met with only in the south and south-west. Of game-birds there are the wild peacock, partridge, quail, snipe, teal, *kalam*, and occasionally the bustard. Except the well-built and agile Mysore cattle, and one or two varieties of buffaloes of northern origin, usually kept by the gaulis, or professional milkmen, the local breeds of cattle are poor.

BELGAUM, the chief town of the district, is situated at an elevation of nearly 2500 feet above sea-level, on the northern slope of the basin of a water-course called the Bellary *nala*, an affluent of the Markandi river, which flows into the Ghatprabha, one of the numerous tributaries of the river Kistna.

The native town lies between the fort on the east and the military cantonment, which extends along its western front, separated from it by a water-course. The site is well wooded. The fort, about 1000 yards in length and 700 in breadth, is surrounded by a broad and deep wet ditch, cut in hard ground. In 1818, after the overthrow of the Peshwa, the place was invested by a British force. After holding out for twenty-one days the garrison of 1600 men capitulated. Since its acquisition by the British Belgaum has increased greatly in size and wealth. The large military cantonment contributes to its prosperity, while a school built for the children of natives of rank adds to its social position and importance.

BELGIUM. The origin of this kingdom as a separate state dates from 1830. In the month of August of that year a revolution began at Brussels which severed the Belgian provinces from the crown of Holland. On the 4th of October following the provisional government at Brussels proclaimed the independence of Belgium; and on the 26th of December it was announced to the congress assembled in that city that the allied powers of Europe had recognized the permanent separation of the Belgian provinces from the kingdom of the NETHERLANDS. In February, 1831, the congress elected the Duke of Nemours to the throne of the newly formed kingdom; but his father, Louis Philippe, king of the French, having refused the crown or the part of his son, a new election took place, and the choice of the representatives then fell upon Prince Leopold of Saxe-Coburg, widower of the Princess Charlotte of England. This prince having accepted the crown, took the oaths prescribed, and ascended the throne in the presence of the congress on the 22nd of July, 1831.

The Belgian territory is bounded on the N. by the Dutch

part of the province of Limbourg, and by North Brabant and Zealand; on the N.W. by the North Sea; on the S.W. and S. by the departments of the Pas de Calais, Nord, Ardennes, and Moselle, in France; and on the E. by the Dutch portion of the grand-duchy of Luxembourg and the grand-duchy of the Lower Rhine.

Area and Population.—This territory lies between 49° 31' and 51° 27' N. lat., and between 2° 37' and 6° E. lon. Its greatest length from S.E. to N.W. is 173 English miles, and its greatest breadth 112 miles. Its form approaches to that of a triangle, the base of which is the French frontier, and its area is computed at about 11,300 English square miles, or twice as large as Yorkshire. It is thus very nearly one-tenth of the area of Great Britain. The country is divided into nine provinces—viz. Anvers (Antwerp), Brabant, East Flanders, West Flanders, Hainault, Liège, Limbourg, Luxembourg, and Namur. The population in 1880 amounted to 5,519,844. At the formation of the kingdom in 1831 the number was only 3,785,000.

The density of the population—495 per English square mile—is greater than that of any kingdom in the world, including even England, Saxony, or Lombardy. In East Flanders it amounts to 800 per English square mile.

Surface and Soil.—The general character of Belgium is that of a low and level country. The chief highland is directly connected with the Vosges, which stretch into the provinces of Luxembourg and Liège. From the neighbourhood of the sources of the Saône and Moselle a branch runs north and divides the waters of the Moselle from those of the Maas. Extending into the southern part of Luxembourg, it gradually declines as it approaches the banks of the Semois and the Sure. The high ground, which is interrupted by these rivers, rises again to a greater elevation on their northern borders, incloses the valley of the Ourthe, and ends between the Ourthe and the Roer, in the mountains of the Holle-Veen. The greatest height of the mountains in the tract described is 2265 feet above the sea. A part of the Ardennes also extends into Belgium, and separates the basin of the Meuse from that of the Schelde. Highly beautiful scenery distinguishes the river valleys, in which are limestone escarpments, caverns, and other natural curiosities, side by side with evidences of high cultivation and of mining and manufacturing activity.

The south-western district of Belgium is geologically the most important. There the coal and ironstone of the country are found. Tertiary strata abound in the north, and mesozoic deposits in the centre, between the rivers Schelde and Demer. The coal-fields of Belgium are in the provinces of Limbourg, Liège, Namur, and Hainault; and many of them are very rich in produce. The annual yield in recent years has averaged 14,000,000 tons. The seams are very numerous but generally thin, and have been subject to such violent derangement from disturbing causes—contorted in every possible manner—as to occasion peculiar difficulty in working them. The other varieties of mineral produce include iron, calamine, lead, copper, zinc (half of all the zinc used in Europe is the produce of Belgian mines), slate, black marble, and common building stone. Belgium possesses several mineral springs, the most celebrated of which are those of Spa.

The soil, which in each of the provinces consists almost entirely of clay and sand, and would have been a heath if left untouched by man, has for the most part been rendered fertile by a due admixture of both these elements. Agricultural industry is carried to a great extent in the kingdom, and the cultivators have availed themselves of every advantage within their reach for increasing their productions. As much as seven-eighths of the whole surface of the country are under cultivation. Even of the uncultivated land a considerable part is occupied by forests, and is therefore productive. Some parts near the sea, called "polders," are so low that the land has to be protected

from inundation by dykes. Numerous places along the banks of the rivers are also protected by dykes. These are called "interior polders." The climate of Belgium is somewhat similar to that of England, but rather colder in winter and hotter in summer, and rain falls on an average 160 days in the year.

Rivers, Canals, &c.—The principal rivers of Belgium are the Maas (or Meuse) and the Schelde. The first, which has its source in the department of Haute Marne in France, enters Belgium about a mile from Givet in the province of Namur. It flows first to the north as far as Hastières, about 17½ miles S. of Namur; it then turns to the N.E., and, after resuming its north course, flows to Namur, where its direction is again changed to E.N.E. The Meuse quits the province of Namur at Huy, and continues the same course to Liège, when it again takes a more northerly direction to Maastricht in Limbourg, which province it enters at Navagne, and quits the Belgian territory between Wessen and Stevenswaard. It receives the waters of the Sambre, Honyon, Mûchaine, Ourthe, Légie, Berwinne, Geer, Genle, and Geleen. The Meuse is navigable through the whole of its course in Belgium; below Liège, however, the passage is rendered difficult by shifting sandbanks.

The Schelde likewise has its source in France, about 1½ mile S.E. of Castelet in the department of Aisne. It enters Belgium immediately after its confluence with the Scurpe, about 12 miles S. of Tournay in Hainault. Its course is N.N.W. to Tournay, which town it divides into two parts; it then turns more to the N., and at the end of 7½ miles, at Hérinnes, forms the boundary line between Hainault and East Flanders. It leaves the former province at Escaemilles, and becomes the common boundary of West and East Flanders to the north-eastern extremity of the commune of Berehem, when its course is altered to N.N.E., and it passes through East Flanders to Ghent. At this town the course of the river turns E., in which direction it continues to Dendermond, where the Schelde again becomes the boundary of two provinces, and divides East Flanders from Antwerp. Its course again changes at Dendermond to N.N.E., and at Antwerp it turns to N.W., in which direction it flows until it quits the Belgian territory between Zealand and North Brabant, and joins the estuary of the West Schelde at the point of its junction with the East Schelde, opposite the S.E. end of the island of Zuid Beveland. It receives the waters of the Lys, Durme, Dender, and Rupel. The Schelde is navigable throughout its whole course in Belgium, and indeed as far as Cambrai in France, 195 miles from the sea. The navigation is, however, rendered somewhat difficult for large vessels at the mouths of the river by sandbanks. From the nature of the country, there being no hills to break the force of the winds, they have a very sensible effect in increasing or diminishing the tides, causing a difference in this respect of 3 or 4 feet in the height of the water in different conditions of the weather.

Belgium is not so well provided as Holland with canals, but it possesses several, some of which are used for irrigation as well as navigation. The Bois-le-Duc Canal extends about 42 miles from Maastricht to Bois-le-Duc. The Bruges and Ghent Canal gives passage to vessels of 100 tons burden; Ghent is also connected with the sea by a ship canal. The Louvain Canal extends from that town to Malines. The Brussels Canal extends northwards from Brussels to Boom, and southwards from Brussels to Charleroi. The canal from Mons to Condé, 24 miles long, is one of the most commercially useful works in the country. The entire length of the river and canal navigation in Belgium is over 1000 miles.

The internal communication of Belgium is greatly aided by a complete network of railways, many of which were either made or are leased by the state. The fares are exceedingly low.

The system of telegraphs in Belgium has been under the control of the government since the year 1850. From the year 1850 to 1862 the tariff was 1½ franc for any ordinary message of twenty words; but in 1862 it was reduced to 1 franc, and in 1865 to half a franc, that being the present scale. The reduction of the tariff has been in every way eminently successful.

Agriculture.—The most general objects of cultivation are wheat, rye, barley, oats, meslin, buck-wheat, hemp, flax (celebrated for its superior quality), madder, hops, chicory, colza, and the artificial grasses, clover, trefoil, lucerne, and sainfoin. The ruta bota (or Swedish turnip), turnips, carrots, parsnips, and potatoes are raised to a considerable extent. Tobacco is grown in some situations, and everywhere similar fruits to those of England are objects of careful cultivation. The great fertility and high state of cultivation in the western and north-western provinces are the boast of the Belgians and the admiration of strangers. Through a wide area the summer landscape is that of a rich and beautiful garden.

In addition to the materials commonly used in England for manure, the Belgian farmers employ considerable quantities of turf-ashes; and they also collect with the utmost care the drainings of dung heaps and other fertilizing liquids. By means of clover and other artificial grasses many cattle are bred and fattened, and these again are serviceable in providing manure for the land.

It is customary to plant trees on the borders of fields and round the villages. Among the timber-trees are the oak, chestnut, horse-chestnut, beech, elm, horn-beam, ash, walnut, fir, and different descriptions of poplars. Cattle, sheep, horses, and pigs are largely reared, and the breed of the horses is much attended to.

Belgium is essentially a country of small farming, the law of succession, combined with other causes, having tended, and continuing to contribute, to the scheme of dispersion and subdivision of land. The leading principles which govern the descent and division of property, whether personal or real, in Belgium, on the death of the owner, is that the children inherit his property in equal shares—the children of deceased sons or daughters representing their deceased parents. When real property cannot be conveniently divided, it is sold and the proceeds divided amongst the heirs; but a sale must only be resorted to if division of a property is almost impossible. The object of this is to prevent the accumulation of landed property. The system was introduced into Belgium at the time of the French Revolution. To illustrate more clearly the extent to which land is divided in Belgium, it appears from the latest official statistics that out of every 100 farmers 43·24 per cent. cultivate less than 50 acres, 12·80 per cent. less than 20 acres, and 28·99 per cent. less than 12 acres. The number of farms over 50 hectares, or about 12½ acres in extent, is only in the proportion of 75 to every 10,000.

As a rule the small farmer, artisan, or labourer who is an owner owns his cottage and a small plot of land (about half a hectare in extent). If he does not earn his bread almost entirely in some industrial pursuit, he hires land in addition to what he owns. In many cases land is an auxiliary means of subsistence to what is gained by industrial pursuits; in others the proceeds from industrial pursuits are an auxiliary to the profits resulting from the cultivation of the soil. Nearly all the peasants in Flanders keep numbers of rabbits in butches, which are largely exported to England, and are known in the markets as Ostend rabbits. The Belgian is averse to the very idea of emigrating; sooner or later, however, he will be forced to do so, for, as we have previously stated, it is already the most densely peopled country in Europe, and the population, both rural and urban, increases rapidly.

Religion and Education.—The great bulk of the people belong to the Roman Catholic Church, there being only

about 14,000 Protestants and 2000 Jews; but the members of all religious persuasions enjoy the most perfect freedom in everything connected with the expression of their opinions and the modes of worship which they may adopt. Part of the incomes of the ministers of each denomination is derived from the public treasury, but the salaries paid are very small. The Catholics are under the spiritual charge of the archbishop of Malines and five bishops—viz. of Bruges, Ghent, Liège, Namur, and Tournay. Belgium contains three universities—Ghent, Liège, and Louvain—in which are classes for medicine, law, moral philosophy, and physical and mathematical sciences. Bruges, Brussels, Namur, and Tournay each contain a public school (Athénée), in which the usual branches of literary education are taught. In addition to the establishments already mentioned, a great number of elementary schools (écoles primaires) are open in the different provinces.

Under the Dutch government education was compulsory, but on the separation of Belgium from Holland the Belgian authorities abolished the compulsory system, and education, which was making steady progress, has since 1830 made but slight advance, and is to a very great extent under the control of the clergy. Many are the complaints of the ignorance of the lower classes. The condition of the agricultural class, in particular—the extreme subdivision of the land amongst peasants, some as owners, some as tenants, who, both young and old, are forced to continuous toil in order to eke out an existence—is naturally a serious impediment to educational progress in the rural districts. In the industrial localities also parents are generally anxious to get their children admitted as soon as possible into workshops and manufactories.

Manufactures and Commerce.—Before the introduction of railways the manufacturing industry of Belgium had declined as compared with the extent to which it was carried on in the fourteenth century. The making of thread-lace originated in Flanders, and up to a comparatively recent period Brussels and Mechlin carried on a large trade in that article; in the former city more than 12,000 persons were once employed in its production. Early in the fourteenth century Louvain contained 4000 looms for woollens, and Brussels and Antwerp had together as large a number. At a date not quite so remote Ghent employed between 30,000 and 40,000 looms for the weaving of woollen and linen goods. It is mentioned that the weavers of that city once mustered 16,000 men in arms under the banners of their respective trades. Antwerp at the time of its capture in 1585 by the Duke of Parma, governor of the Spanish Netherlands, contained a large population employed in manufacturing woollen and silk goods; but through the tyranny of its conquerors the artisans were driven away, and many of them took refuge in England, where their example and instruction were of great use for the improvement of the English silk trade. The woollen manufacture is now prosecuted at Verviers, Charleroi, Tournay, Mons, and some other towns. Cotton spinning and weaving are carried on in some of the larger towns. Liège and Maastricht contain large tanneries. At Antwerp, Ostend, and Ghent there are some sugar refineries; cutlery is made at Namur, and fire-arms in considerable quantities at Liège. Breweries are numerous and extensive in most of the principal towns throughout the kingdom. Of late years the trade of the country has very materially revived, especially in the production of coal and iron at Liège and Namur. Wages are so much lower than in England that the Belgian ironmasters are often able to compete successfully with the English in many foreign markets both in manufactured and unmanufactured goods of a certain kind. Belgian woollen manufactures also compete severely with those of England. The Belgian workman is not to be compared to his lively neighbour, the Frenchman. His fort lies in producing a cheap article, not a good one, and he

gets paid accordingly. In domestic trades, such as carpentering, tailoring, and the like, the careful workman is his own master, renting a small house with a little shop for his wife, of which he lets off as much as he can spare. Such a man will earn from 4s. to 6s. a day, while the young and improvident art-artisan who works for others as a journeyman thinks himself lucky if he gets 2s. He, however, never dreams of working upon Mondays or 'Fête days, and relies upon public or private charity to help him to exist, which he contrives to do upon potatoes, vegetable soups, weak coffee, inferior bread, and very little meat. This class is equally badly housed; they herd together in the most dismal streets of the great cities, or crowd the damp hovels which surround the country towns and the pit mouth. Their dwellings are as fine fields for epidemics as it is possible to conceive, as they are seldom able to afford more than one room, to which a lodger is frequently admitted, and the moral taint of overcrowding falls heavily upon them. Miners, colliers, engineers, and workers in copper, iron, and glass are better paid, better fed, better clothed, and better lodged. Barring the miners, these are a steadier class of men, living generally in the upper parts of respectable business premises in the suburbs. Most of them can read and calculate tolerably well; but, despite these advantages, are hardly as well informed as the same class of English workmen. Like the Frenchman, the Belgian has his Council of Prud'hommes to settle trade disputes cheaply and expeditiously, his friendly societies, and his annuity societies. Trade-unions exist, but have little influence except in the coal and mining districts.

To prevent the misery, and often the crime, arising from the want of employment among the working classes, charity workshops are established in Ghent, Liège, and other towns, which are accessible to all workmen without employment and in poor circumstances. The able-bodied are paid according to their work, and the aged and infirm according to their necessities. These workshops of apprenticeship and improvement are intended not only to supply work to the unemployed, but also to initiate the people in the exercise of new or improved branches of industry, and to instruct young men in some trade or profession by which they may be able to gain an honest livelihood. They have been of great benefit to many of the poorer classes, who must otherwise have been brought up as vagrants and beggars. Similar to these are the manufacturing schools, intended principally for girls, where they are employed in making lace, &c.

The import and export trade of Belgium presented before 1830 an annual average of £12,000,000. Up to 1840 it ranged between £12,000,000 and £16,000,000; between 1840 and 1850 it increased to about £36,000,000; between 1850 and 1860, to £69,000,000; in 1884 it had reached over £120,000,000. It is chiefly with Germany, France, Great Britain, the Netherlands, and America. The exports are chiefly coal, and flax and woollen manufactures; and the imports cereals, silks, and wine. The trade with Great Britain now amounts to over £23,000,000 per annum, as shown by the most recent statistics—exports of British produce to Belgium, £8,497,199; imports from Belgium, £15,135,291. In 1860 the total trade between the two countries was only valued at £8,000,000 per annum. The chief articles imported into Great Britain from Belgium are sheep, rabbits, butter, silk, flax, candles, glass, hides, paper, refined sugar, and woollen yarn. The articles sent to Belgium consist principally of cotton and woollen goods. In addition to the exports of British produce from the United Kingdom to Belgium, foreign and colonial produce—chiefly raw cotton and wool—is exported thence to the value of between £6,000,000 and £7,000,000 per annum.

The foreign trade of the country is carried on mainly through the medium of foreign shipping, the number of

vessels (sailing and steam) of which the Belgian merchant navy is composed being very small.

Government.—Belgium is called a limited constitutional monarchy. The succession is limited to the direct male line, to the perpetual exclusion of females and their descendants. In default of a male heir, the king, with the consent of the legislative chambers, may nominate his successor, and in further default of such nomination the throne is declared vacant. The legislative power is vested in the king and two chambers—the Senate and Chamber of Representatives. The members of these chambers are elected by citizens paying not less than 43 francs (about 35s.) annually of direct taxes. The number of deputies varies with the population, and cannot exceed one member for every 40,000 inhabitants; and the number of senators is half as many as the deputies. The deputies are elected for four years, and the senators for eight years. The deputies receive pay at the rate of 430 francs each per month, during the sittings of the chamber. Each branch of the legislature may originate laws; with this exception, that every law relating to the receipt or expenditure of money for public purposes must be first voted by the Chamber of Representatives. The ordinary sittings of both chambers are held in public; but each chamber, on the demand of the president or of ten members, may form itself into a secret committee, and when so formed it rests with the majority of the chamber to decide whether or not the sittings shall continue to be secret. If a member of either of the legislative houses accepts an office of emolument under the crown, he vacates his seat until re-elected.

The chambers assemble as of right every year in November, unless they shall have been previously called together by the king. The session must last at least forty days; its prorogation is pronounced by the king.

The prerogatives of the king, with respect to choice of ministers, nominating to civil and military offices, making treaties of peace or declarations of war, coining of money, administration of the laws, &c., approximate very nearly to those of England. No taxes can be levied by the state unless previously established by a law passed by the chambers, and all such taxes must be voted annually.

There are elected councils in each province for the management of local affairs, which are of great importance to the country. They give a healthy stimulus to agriculture, trade, and commerce, and direct the construction and repair of roads, canals, and bridges. The communes have the power of appeal to the king if they consider themselves aggrieved by any acts of the provincial council. Matters exclusively communal are managed by elected communal councils. Personal liberty, and liberty of conscience in the fullest sense, are guaranteed by the constitution to every citizen; all are amenable to the laws, and all are placed equally under their protection. The press is free, and it is decreed that no censorship shall ever be established.

Army.—The standing army is formed by conscription, to which every able man who has completed his nineteenth year is liable. Substitution is permitted, but the military law of 1873 provided very strict precautions against abuse of the system. The legal period of service is eight years, of which, however, two-thirds are allowed, as a rule, on furlough. The war strength of the army is 100,000, and 40,000 in times of peace. The spirit and patriotism of the people, as well as the thorough efficiency and preparedness of the national resources, were strikingly shown at the outbreak of the Franco-German war of 1870–71. A few days sufficed to place the fortresses and their garrisons in complete readiness for defence, and to send to the frontier an army of 65,000 men, fully equipped with artillery, train, and all other necessities. The wisdom of such preparedness was manifest soon after the war was declared, when a projected treaty between France and Prussia was made public, which showed that the former

power had seriously meditated the absorption of the little kingdom. The British government, mindful of its treaty obligations, at once took the most effectual measures possible to insure respect for the independence of Belgium from both belligerents, and no violation of neutrality took place during the war. The whole military position of Belgium is essentially defensive. There are several excellent fortresses, but within the last few years most of the old fortifications have been demolished, and the defence concentrated in the magnificent modern fortress of Antwerp. It is of recent construction, and no expense, nor anything that modern engineering science could suggest, was spared by its distinguished constructor, Colonel Brialmont, to render it almost the strongest, and under certain conditions certainly the strongest fortress in Europe. Besides the standing army there is also the civic militia, organized to maintain liberty and order in times of peace, and to defend the independence of the country in time of war. It numbers 125,000 men without, and 400,000 men with the reserve, is composed of all citizens between twenty-one and forty able to bear arms, but is in active service only in towns having more than 10,000 inhabitants, and in fortresses. The men elect their own officers up to the rank of colonel, and during peace the force is under the ministry of the interior, but in time of war is transferred to the ministry of war, and subjected to military discipline.

Revenue.—The revenue of Belgium is about £11,500,000 per annum, of which over £4,000,000 is derived from railways and telegraphs. The public debt amounts to about £58,000,000, including over £4,000,000 which Belgium had to take over as its share of the liabilities of the Netherlands when it separated from that country. Most of the remainder has been raised for, and employed in, the construction of works of public utility, particularly railways. The first lines constructed and worked by the state, being great trunk lines, gave every year an increasing return which enriched the Treasury. To these were first added conceded lines, which had to be purchased from companies at high prices; then secondary lines, whose traffic was unremunerative. After many previous experiments, the accounts of the railway have been since 1878 drawn up on a new and presumably more accurate principle. The Treasury is now considered as the banker of the railway. It is assumed that all funds advanced by the former are chargeable with an interest of 4 per cent., and repayable within ninety years. According to this new method of book-keeping, it appears that the railway contributed largely to the revenue until 1872 inclusively, but that since that year it has, on the contrary, entailed an annual loss. The tariffs on passengers and merchandise in Belgium are much lower than those prevailing in the rest of Europe; and it is maintained by many Belgians that, notwithstanding the loss in recent years, the experiment is a great success, and bears evidence in favour of state ownership. The railway, they argue, is worked in the interests of trade and industry, therefore of the whole community. It is considered that the benefit thus indirectly accruing to the public at large is greater than that which might be realized by aiming at a commercial profit for the direct and immediate benefit of the taxpayers. It is certain that, if managed solely as a commercial enterprise, the railway would not have proved such a stimulus of national prosperity.

Belgium was one of the four Continental states—France, Italy, Belgium, and Switzerland—which formed a monetary league in 1865. The four states entered into a convention by which they agreed upon the French decimal system, establishing perfect reciprocity in the currency of the four countries, and giving the *franc, livre, or lira*, the monetary unit of each of them, as well as its multiples or fractions in gold or silver, the same course and value throughout the extent of their respective territories.

History.—After forming successively part of the French, Burgundian, and Spanish dominions, Belgium in the eighteenth century passed into the hands of Austria. In 1815 it was united to Holland, and with it formed the kingdom of the Netherlands until 1830. Its independence as a separate state is now guaranteed by the powers of Europe. It has been called "the cockpit of Europe," having been the scene of many severe struggles between contending armies.

Belgium is supposed to have been originally occupied by Celtic inhabitants, but derives its name from the Belgæ, a Germanic tribe, who intruded upon the natives, reduced them to subjection, and extended their incursions to the southern shores of England. The present population is not homogeneous, but belongs to these two distinct stocks. In the northern provinces the people are of Germanic origin, therefore Belgians proper, formerly called Flemings, and the lower classes speak the Flemish language, which is merely a form of the Dutch. In the southern districts they are Walloons, of mixed Celtic extraction like the French, and use the Walloon tongue, which is precisely the same as the French of the thirteenth century. But pure French is uniformly the language of the government, of literature, of educated society, and is generally understood except in remote rural situations; while pure German is spoken in places adjoining the frontier of that country. Both races, though with little real sympathy between them, agree on various points. They have generally a profound veneration for the clergy, and will often observe rites and ceremonies in which the priests take part, which surprise the stranger by their extreme puerility. While at no period eminent for literature, they have carried the fine arts to a high degree of perfection in the departments of painting and architecture. The artists of the early Flemish school, founded by Van Eyck, excelled in brilliancy of colouring and the faithful imitation of nature, to which those of a later school, represented by Rubens, added nobleness of design, combined with freedom of execution and harmony of parts. In architecture the fine examples of Gothic are not confined to the churches, but include town-halls, with other civic buildings, and some private dwelling-houses raised by the opulent burghers of bygone times. All classes are distinguished by a passionate attachment to civil liberty; yet patriotism, owing to repeated change of masters, fluctuating territorial limits, and correspondences to bordering communities, can scarcely be said to exist, in the ordinary sense of the term. Local attachments refer to the town or village of birth rather than to the country.

The popular fondness for spectacles has descended from very ancient times, and though not carried to the same extravagant length as formerly, the exhibitions on festival days which best please the public are not a little grotesque. A score of towns might be mentioned familiar with wicker-work giants and giantesses, which figure in processions on holidays; and still-walkers still appear in the streets of Namur on occasions of general merriment. A strong taste for music is universal; this is evinced by frequent assemblies of amateur performers, many of whom belong to the labouring classes; and by the claims from the towers of the town-halls and the church steeples, which are constantly pouring forth their notes on the passing breeze. In the great towns a salaried musical professor is retained to amuse the citizens daily by playing upon the bells.

BELGOROD, the chief town of a circle in the Russian province of Kursk, stands on the small river Ziorka or Wessolka, about 90 miles south of the city of Kursk, and has a population of 14,000. It is divided into the Old (Russian, *Bialgorod*, "white town") and New Town, and has three suburbs; the Old Town is surrounded by a rampart and ditch, but the New Town by palisades only. There are several manufactories for refining and pressing

wax, and for spinning and weaving; and it carries on a considerable trade in hemp, bristles, honey, wax, leather, soap, &c. Three large fairs are held annually. The environs are productive in fruit, for which the district is much celebrated.

BELGRADE, the capital of Serbia, is situated at the junction of the Save and the Danube, and on the right bank of both rivers, which are here very broad and navigable. The population in 1883 was 30,000. The city was formerly very strongly fortified, and was long famous in the military annals of Turkey. Under the treaty of Berlin of 1878 the old fortress was dismantled. It is the best built town in Serbia, and great improvements have been effected in recent years. It is gradually becoming more and more European in appearance. The mixed population of the city, consisting chiefly of Serbians, Turks, and Greeks, distinguishable at once by their costume, present an interesting scene to the stranger. The city is the residence of an archbishop, and contains nearly 100 mosques and churches, several large bazaars, twelve baths, and many other important public buildings, among which may be mentioned the palace of the King of Serbia and some spacious schools. Belgrade is the principal entrepôt of the trade between Constantinople and Salonici on one side, and Vienna and Pesth on the other. The exports consist of wool, dressed skins, buffalo and cow hides, wax, honey, tan-bark, silk, oxen and cows, immense numbers of pigs, and firewood. From Hungary, hardware, delf, porcelain, pottery, and salt are imported; and from Scutlin, opposite to Belgrade, the city is supplied with wheat, flour, oats, meat, vegetables, and fruits. There is considerable manufacturing industry among the inhabitants. Carpets, silk and cotton stuffs, arms, and leather are made. Belgrade, when visited by Dr. Edward Brown in the latter part of the seventeenth century, was described as enjoying a large amount of commercial prosperity, greatly favoured by its excellent position at the confluence of the Danube and Save. The city, however, like most others under Turkish rule, fell into ruinous decay, and became chiefly remarkable for its studious violation of every rule of cleanliness. In 1867 the Turkish garrison which had so long weighed upon it, the city in a few years not only commenced to wear an improved aspect, but also to regain its former commercial prosperity.

BELIAL (usually pronounced Be'lial, but more correctly Bel'ial) is one of the few compound words in the Hebrew language. It is formed of two words, meaning *nothingness* and *utility*. Hence Belial means a worthless fellow. A man of Belial, or a son of Belial, a daughter of Belial, means in the Bible a wicked person (see Deut. xiii. 13, Judg. xix. 22, 1 Sam. xxv. 17, &c.) Belial, if emphatically used, means the worst of spirits.

BELIEF. In common language this means the assent given by the mind to any declaration, proposition, or statement, the truth of which is not known with absolute certainty, but which has reasonable evidence for its support. It is also given to the acceptance of truths which, though they are capable of being demonstrated, are received simply on the testimony of others, and to the statement of facts and incidents related by persons regarded as worthy of trust. Thus most of the truths ascertained by science are capable of demonstration, but very few people are able to follow intelligently the chain of reasoning, the series of observations, or the mathematical calculations necessary for this. But when there is a general agreement among those who are qualified to make the necessary tests, the results agreed upon are accepted by the majority without hesitation or question. This term is also used to denote the trust in the reality of the events recorded by the memory, and the anticipation of events in the future similar to those of the past and present.

In theology belief is generally synonymous with faith, and it serves to designate the confidence felt as to the reality of God, of his attributes, of our moral responsibility, and of the future life. It is also given to the acceptance of theological tenets, and a man is spoken of as believing in the authority of the Scriptures in any particular doctrine or definition; and a "believer" sometimes means the same thing as a Christian. In another sense it is used for the things believed in, and a statement of doctrine or creed is called a belief.

While, however, the term is freely used, and its various meanings are sufficiently indicated in ordinary speech, the questions as to what state of mind is implied by the word, and to the distinction between belief and knowledge, have proved very difficult to metaphysicians, and can hardly yet be considered as being sufficiently investigated or defined.

Among British thinkers Hume was the first to endeavour to analyze this state of mind, which he defined as being a feeling derived from the results of experience, and asserted that "all belief of matter-of-fact or real existence is derived merely from some object present to the memory or senses, and a customary conjunction between that and some other object; or in other words, having found, in many instances, that any two kinds of objects, flame and heat, snow and cold, have always been conjoined together; if flame or snow be presented anew to the senses, the mind is caused by custom to expect heat or cold, and to *believe* that such a quality does exist, which will discover itself upon a nearer approach."

Hume's conclusions have been opposed or modified by subsequent philosophers, notably by Reid, and as before stated there still exists considerable divergence in the theories propounded on this subject. One of the latest is that of Professor Bain, who regards belief as a "phase of our active nature, otherwise called the will," and defines belief as being "*a growth or development of the will under the pursuit of intermediate ends.*" When a voluntary act at once brings pleasure (as in eating pleasant food) we experience the primitive course of the will, in pursuit of an end; but when belief sways us we pursue *intermediate* ends, in the conviction of obtaining our ultimate end, pleasure. Thus we procure an orange, we peel it, &c.—actions (to intermediate ends) all of which in themselves are unprofitable—under the belief that through these we shall ultimately enjoy the fruit, this being our ideal motive, our true end. It will be necessary to indicate some of the principal heads of Professor Bain's argument, but the reader is referred to his "*Emotions and Will*," or to his shorter work, "*Mental and Moral Science*," for a masterly exposition of the doctrine.

1. In believing that snow is cold (Hume's illustration), are we only making a purely intellectual judgment? Such a judgment exists, but there is something beyond it; for a precisely similar conception may be formed without any belief. We may understand accurately what is meant when it is asserted that oxygen can be a liquid, but to believe it we must have something more than this comprehension. Intellect alone is therefore insufficient to give the basis of belief. Feeling also is insufficient, for we may desire a thing very greatly and yet know well that we shall not, or may not attain it. There remains the third function of the mind—the will, that which regulates action; and here we discover the basis of belief. For when a man fully conceives a thing by his intellect, and acts out that conception by his will, our common judgment is that he really believes that thing. A man professing to believe in the teachings of Jesus, and acting in opposition to them, is justly suspected as hypocritical, as deficient in actual belief. In short, *what we believe we act upon.*

2. But it may be objected that we believe oftentimes without acting, as in the case of the imperfect believer in Christ just mentioned, who may be weak rather than

hypocritical; and that we believe even where we cannot act, as when we accept the teachings of history. The first objection is met by the fact that belief, though genuine, may be overpowered by a stronger motive, as when a niggardly man withholds charity from an object he knows to be deserving; and the second is met by the consideration that "what we believe we *would* act upon if we could," as when a poor man cannot afford to give money in charity.

3. Belief in abstract propositions and in courses of reasoning comes under this definition, for it will be found to rest ultimately upon some few axioms or matters of common experience, as that "2 and 2 make 4," &c., and on these we do habitually act. So also belief in such cases as the teachings of men of science, &c., reposes on the fact that in those points where we can test their statements by action we find them accurate; therefore we extend our belief to their entire writings.

4. The opposite of belief is not disbelief, for we have the same attitude of mind in accepting or rejecting belief in a thing. It is *doubt* which opposes belief. Hope, and its opposite, despondency, are phases of belief.

The effect of noble faiths, or beliefs, upon the mind is probably the most invigorating of any possible influence; and we may conclude this article in the words of the great Scotch philosopher:—"All epochs wherein *Belief* prevails, under what form it may, are splendid, heart-elevating, fruitful for contemporaries and posterity. All epochs, on the contrary, wherein *Unbelief*, under what form soever, maintains its sorry victory, should they even for a moment glitter with a sham splendour, vanish from the eyes of posterity; because no one chooses to burden himself with the study of the unfruitful" (Carlyle, "Diderot").

BELISARIUS, one of the most famous generals of the dark ages, was the mainstay of the power of the Emperor Justinian. He saved the empire in a dangerous sedition, A.D. 532; he utterly destroyed the Vandal kingdom in A.D. 534, after North Africa had been in the hands of the barbarians for a century; and in a campaign against the Gothic kingdoms of Italy, undertaken in the next year, he had great success, and had reduced Sicily when his jealous master recalled him. He was allowed a second five years' campaign to save those conquests which he alone could keep, only to be recalled on the point of final victory, in order that his rival Narses might reap the fruits of his skill. Four times in his career did he drive back dangerous attacks of the Persians, and each time was recalled in disgrace, either through caprice or fear. His wife, as licentious as the notorious Empress Theodora, of whom she was the intimate confidante, was one of the chief intriguers against him, but the treacherous conduct of her and of the sovereign never succeeded in shaking the loyalty of Belisarius. The emperor dreaded his reputation, and his very genius was his danger. He was allowed to linger in ignoble retirement until a serious peril to the state arose in 559, by an advance of the Bulgarian hordes under Zabergau; and the aged veteran alone was able to save Constantinople. This crowning service was enough to bring down on him a crowning disgrace. Justinian, now eighty-one years old, had him falsely accused of conspiracy to murder the emperor, and though he graciously spared his life, he robbed him of all that he possessed, and so grievously afflicted him by a long imprisonment, that eight months after his final acquittal Belisarius died (A.D. 565). Later fiction added, without any known authority, that the venerable warrior was deprived of sight by the tyrant, and was found begging for bread in the streets—"Give a penny to Belisarius the general" (Marmontel, "Belisaire"). The detestable Justinian died a few months after. Belisarius' friend and companion, Procopius, has left very full accounts of his campaigns, and of the base intrigues of the time.

BELIZE or **BALIZE**, the chief town of the colony of British Honduras, and the only trading port, is situated

in 17° 29' N. lat., 88° 8' W. lon., at the southern mouth of the river Belize, which divides the town into two parts, and is crossed by a substantial wooden bridge of 220 feet span and 20 in width. Many of the houses are convenient, well built, spacious, and even elegant, constructed entirely of wood, and raised 8 or 10 feet from the ground, on pillars of mahogany. There are a governor's house, court-house, church, hospital, guol, and some schools. The groups of lofty cocoa-nut trees, interspersed with the foliage of the tamarind, give a pleasing and picturesque appearance to the dwellings, independent of the agreeable shade they afford. The streets are regular, and intersect each other at right angles. The manufacture of oil from cocoa-nut is carried on extensively, and the fibre is also worked up for mattresses, &c. There is regular steam communication with Jamaica. The chief exports are mahogany, rosewood, cedar, logwood, and cocoa nuts. The population in 1881 was 5767.

BELL, a musical instrument, consisting of a cup or bowl of metal sounded by being struck with a hammer or clapper, either from within or without. The first method gives the finer sound; and as regards church bells (the noblest form of the instrument), the mode of ringing is to hang the clapper loose within the bell, and swing the bell till the clapper hits it. Indeed in no other way can that characteristic tone of bells to which Tennyson has felicitously applied the epithet "wild," be thoroughly brought out.

"Ring out, wild bells, to the wild sky"

could not be applied to fixed bells chimed by apparatus, nor to the similarly worked chimes of clocks; and these represent the main forms of bells struck from the outside. The feeble result of that performance where an itinerant player strikes with a small mallet bells hung in series on a frame, is no doubt known to many readers; as is also the far superior effect produced by "hand bell ringers," who hang their clappers within the bells they use—clever performers manipulating four bells each, two on either hand.

The name of the bell indicates its original purpose; it is the Anglo-Saxon *bella*, "the thing which makes a noise;" and *bellow* and *bull* are other forms of the same root, which is traceable up to the primitive ARYAN ROOT ✓ *BUAL*.

The origin of the bell is lost; we find it already in use in the earliest records of human society. Aaron (and the high-priests after him) wore bells of pure gold alternately with other ornaments along the hem of the robe (Ex. xxviii. and xxxix.), that his movements might be revealed when he approached the holy place; and the inscription HOLINESS TO THE LORD, which he bore on a gold frontal, is alluded to in a prophecy of Zechariah (xiv.) as to be inscribed on bells borne by horses in the coming "golden age"—a very early specimen of those pious inscriptions which have been placed on bells used in religious services down to this day. It will be seen that the latest of the family of monster bells, "Great Paul," bears also her motto (a bell, like a ship, is feminine with her admirers). Earlier than Moses, Egyptian festivals of the god Osiris began with bell-ringing; and later than his time, though still in remote antiquity, the Greek priests of Dionysus and Cybele rejoiced in bells amongst other appliances for making the greatest possible noise [see BACCHANALIA]; also among the Greeks we find hand-bells to have been used in camps and garrisons, by patrols who went round to visit the sentinels. Such bells were termed *cōdin*. The Romans had three chief appellations for the little bell—*petasus*, *codo*, and *tintinnabulum*; the second of these was evidently borrowed from the Greek word already mentioned; the last was probably intended to be imitative of the sound of the bell. The hour of bathing among the Romans was announced by a bell; it was also in domestic use, was

adopted both as an ornament and an emblem upon triumphal cars, and was fastened to the necks of cattle and sheep that they might be traced when they strayed. It is believed that church bells were first used to summon worshippers by Paulinus, bishop of Nola in Campania (A.D. 400); and although there is no historical record of this fact, it seems to be borne out by the words *nolite* (our *knoll* or *knell*) and *campana* (whence *campanile*, or bell-tower) being the general names for bell at this time. Sabianus, pope in 604, ordered the bells to ring the *hora canonica* at the proper times during the day, and Benedict Biscop, abbot of Wearmouth, brought his bells from Italy about 680. These were probably hand-bells; bells hung in towers are not known to be earlier than the ninth century. St. Gall's bell (650), made of iron plates, and St. Patrick's bell (contemporary with Paulinus of Nola) are still shown, the former in the Swiss town bearing the saint's name, the latter at Belfast. These are small iron bells about 6 inches high. About the thirteenth century church bells began to increase in size, and were dedicated to their functions with holy rites, frequently bearing names, and still more often pious inscriptions. They were held to drive away evil spirits from the passing soul (the *passing bell*), to disperse lightning, &c. A special endowment for the latter purpose was attached to Old St. Paul's. *Mortuos plango, Fulgura frango* ("I lament the dead, I shatter the lightning"), ran the old phrase. A special use in England was the *curefew* bell (*couvre-feu*), said to be introduced by William the Conqueror, but really of much earlier date; probably it had the double object—first, of preventing conspiracy under cover of the dark, for all men had to retire at eight o'clock curfew, and put out lights and fires; and next as a precaution against the frequent fires which burned down whole villages when houses were of wood. The *sanctus bell* is part of the ceremony of the mass, and of course continues to this day; it is rung by an assistant in the service when the priest raises the host at the words *Sanctus, sanctus, sanctus, Dominus Deus Sabaoth* ("Holy, holy, holy, Lord God of Sabaoth"), that those without the church may also participate if they choose; and in Catholic countries it is the custom of poorer folk to kneel if they hear the *sanctus*. The *angelus*, a bell rung at morning, noon, and evening, when (by an edict of Pope John XXII. A.D. 1326) the faithful are to repeat the *Ave Maria*, is also still retained; and the evening prayer is especially observed in most Continental countries at the sound of the *angelus*.

Fig. 5 in Plate gives a section, drawn to scale, of the most approved form of bell, any serious deviation from which is found to be accompanied with a deterioration in tone. In this figure the unit measure is the thickness of the bell at *g*, the "sound-bow." The diameter of the bell is 13 to 15 times this unit, and the *semidiameter*, *a c.* is $7\frac{1}{2}$. The height of the bell, *a l*, from *lip* to *crown*, is 12. The bell at the top must have a thickness of two-thirds of the unit, and is struck out from the centre, *f*, found by inflecting $a f = 8$ units on the perpendicular, *c c.* If the bell be too flat, as in fig. 3, it expels the included air with an unpleasant jerk, producing a loud, disagreeable sound. If the bell be too long in proportion to its width, as in fig. 4, the air is set in motion like the air included in an organ-pipe, and the bell is not well heard in a horizontal direction. This is the great defect of the Chinese bells, which are formed on the model of some of the Campanulaceæ, or similar monopetalous plants. In fig. 1 we have represented an approximation to the best shape, both for loudness and tone. A bell divides itself into vibrating *lunes* by meridional nodes, and not by circular nodes. If the bell be wetted and then covered by sand, and struck cautiously so as to bring out only the fundamental note, four lines of sand will remain, marking out as nodes four quadrantal meridians on the bell, as is shown in fig. 2.

Of the four quadrantal lines into which the bell is thus divided—two of them, *a b* and *d c*, are always in a phase of vibration opposite to that of the other two, *a d* and *b c*, and the nodal meridians, *d o c* and *d o b*, will remain constantly at rest during the vibration of the bell.

The approved shape is not the result of any theory, but is found to be the best by long experience. The *sound-bow* is always thicker than any other part of the bell; its position has already been pointed out. The hooks at the top for fixing church bells are called *canons*, and are cast on the bell, as well as the internal loop for holding the clapper or *tongue*. Sir E. Beckett recommends doing away with canons and bolting the bell direct on to the *stock* or beam which supports it, and also separately bolting the clapper-ring; and this has the great advantage of permitting the bell to be partly turned round when, after many years, the continual beating of the tongue has worn a furrow in one part of the sound-bow, the result of which is often a crack, and the consequent destruction of the bell.

Bells are made of a mixture of copper and tin, about 3 to 1, or in modern work 22 of copper to 7 of tin, the latter metal, if in excess, making the bell brittle. The copper, if in excess, destroys the brilliancy of tone. Glass bells have a fine tone, but their brittleness prevents their use.

Bells are lower in pitch in proportion as their thickness diminishes with regard to their size; to tune a bell therefore, if it is too sharp, the thickness of the sound bow is reduced a little. If the bell needs to be sharper the rim is turned away, so as to make it smaller. Bell-founding is now so accurate, however, that whole peals of correct "uniden" (i.e. untuned) bells are frequently produced. The mode of founding large bells is to build up a core of brickwork, &c., coated with clay, which is shaped to the interior mould of the bell by a revolving "sweep," whose edge scrapes down the clay to its own contour, as it turns round the central pivot which projects from the core. The core is hardened by fire built in its hollow interior. The outer surface of the bell is then made in exactly the reverse fashion, by means of a clay lining moulded under a sweep revolving inside a large metal *cope*. When therefore the cope, with its shaped and hardened lining, is placed over the core, there is just the space of the thickness of the bell left between them; and into this molten metal is poured, after the moulds for the canons and clapper-ring have been duly attached.

The ringing of bells in *changes* or *peals* is a matter of considerable art. The clashing of bells pell-mell demands no skill, and the ringing of a peal from treble to bass in regular order, or the reverse, is easily accomplished. The following table will show, however, that to exhaust the changes on a large peal of bells is an onerous undertaking, for even a triple, rung on a peal of seven bells, demands 5040 separate variations, and takes skillful ringers about three hours; and the method of changing or "dodging," under the guidance of a skilled conductor, is most intricate and interesting. We refer our readers to "Change Ringing," by William Banister, as the authority upon this subject. We add the names of the various grades of peals:—

Round, . . .	3 bells,	6 changes possible.
Single, . . .	4 "	24 "
Double or		
Grandsire, 5 "		120 "
Bob Minor, 6 "		720 "
Triple, . . .	7 "	5,040† "
Bob Major, . 8 "		40,320† "
Cater, . . .	9 "	362,880 "
Bob Royal, . 10 "		3,628,800 "
Cinque, . . .	11 "	39,916,800 "
Bob Maximus, 12 "		479,001,600 "

* $\frac{1}{2}$ hour. † $3\frac{1}{2}$ hours. ‡ 28 hours.

The last three, if not four, are quite impossible, for the Bob Maximus would take ninety-one years to ring, at two strokes a second!

Bells are hung in church belfries, as above stated, to large beams (the "stock") by their canons. The stock is fitted to one of the spokes, and also to the axle, of a large wheel, round the rim of which runs the bell-rope. Therefore, pulling the rope would swing the bell mouth upwards, and this is called "setting the bell." Precaution is taken against the bell swinging round and round, for a *stay* projects from the top of the stock and catches against a *slider* when the bell is set, and when consequently the stock is below the bell. The ringer then, by pulling his rope, causes the bell to swing round till the stay catches the slider on one side, and then matters are so arranged by the way the rope is fixed that his next pull will cause the bell to turn completely round in the opposite direction till the stay strikes the slider on the opposite side to the first. At each swing, therefore, the bell starts mouth in air, comes down to a hanging position, swings further round—till she is mouth in air again—to nearly (but not quite) the same position as at first, and repeats this motion at the next swing in the opposite direction. These pulls are called the "hand pull" and "back stroke" respectively.

In 1882 "Great Paul" (fig. 6 in Plate), the heaviest bell in England, was successfully cast, and hung in St. Paul's Cathedral, London, with an impressive religious ceremony. The bell bears the arms of the dean and the motto, *Væ mihi, si non evangelisaverero*. She was cast in the foundry of Mr. Taylor at Loughborough. Three furnaces, one of which was specially built for the purpose, poured out more than 20 tons of molten metal into the gigantic mould of "Great Paul," and after writing off "overplus" and "waste," this left actually in the mould a weight of 16 $\frac{3}{4}$ tons. This mass of metal, consisting of pure tin and copper in due proportions, was about 8 $\frac{1}{2}$ hours in course of melting. Four minutes after the rush of molten metal the mould was full, at 10.30 p.m. on 23rd November, and "Great Paul" came into existence in one of those deep "pits" so mysterious to lookers on. It was not until the evening of the 29th, that the heat had sufficiently abated to allow the men to hoist out of the pit the mould and bell in their "case." This cast-iron "case" had an all-important duty to perform; it had to resist the enormous strain of such a weight of metal when forcing itself impetuously into the mould; and so, in order to prevent a bursting asunder of the mould, it was made strong enough to bear a pressure of 200 tons. Including clamps and bolts, it is probable that the whole weight of this huge box was not far short of 25 tons. The "skin" of the casting showed no flaw of any kind whatever; and when the tone was produced by swinging a heavy ball of iron against the sound-bow, a musical note boomed out which was impressive beyond description. The dimensions of the bell are as follows:—Height perpendicular (from lip to top of canons), 8 ft. 10 in.; diameter (from edge to edge of lip), 9 ft. 6 $\frac{1}{2}$ in.; thickness (of middle of sound-bow), 8 $\frac{1}{2}$ in., or about one-thirteenth of the diameter. The note is E flat, the upper partials B flat, E flat and G being just audible with the sonorous ground-tone. The cost of the bell and hoisting it into its place in the upper part of the north-west tower was about £3000. The railway companies declined to risk the conveyance of so great a load; it was therefore brought to London by road on a massive trolley (bell and trolley together weighing 22 tons), drawn by a traction engine. The door of the cathedral had to be cut away to admit the monster, after its journey of eleven days. The great "hour" bell of St. Paul's ("Great Paul") is for special occasions only weighs 5 tons 4 cwt., as against the 16 tons 15 cwt. of her superior.

The great bells at Westminster are four "quarter-bells" and "Big Ben," which strikes the hours; the dimensions

of the former are as follows:—The first weighs $4\frac{1}{2}$ tons, and gives the note B; the second weighs 2 tons, and sounds E; the third, weighing $1\frac{1}{2}$ ton, is tuned to F sharp; and the fourth, weighing only 1 ton, gives G sharp. In the middle of the belfry it was proposed to suspend the hour bell, "Big Ben," which was to have been some 9 feet in diameter, and to have weighed 14 tons (the hammer itself which was to have struck it weighing 1 ton), and its note was to have been E, an octave below that of the 2-ton bell. It was designed by Sir E. B. Denison. It was cast in 1856 by Warner & Son, near Stockton-on-Tees; was brought safely up to London, and hung at the base of the Clock Tower, to be tried. Upon sounding it, however, with its 12-cwt. clapper it was found to be cracked; and further that there was an actual flaw in the metal, which must under any circumstances have insured the ultimate fracture of the bell by the blows of the hammer. It was then broken up, and the pieces carried down to Whitechapel to Mears' bell-foundry, where it was recast, with $2\frac{1}{2}$ tons less metal, and a much lighter clapper—the latter, in fact, only weighing 6 cwt. For a time things went well with this; but eventually it cracked like its predecessor, but not so badly. For a considerable period after this the hours were struck on the $4\frac{1}{2}$ -ton bell; but the big one was subsequently patched up, and all residents in London are now familiar with its deep boom. The two "Bens" cost the country some £4000. "Great Tom" of Oxford, formerly the largest bell in this country, weighs 7 tons 12 cwt.;—some 4 cwt. less than the chief bell in Exeter Cathedral. The great bell at Erfurt, $10\frac{1}{2}$ feet high and $8\frac{1}{2}$ feet in diameter, only weighs 11 tons 3 cwt.; while the largest bell in actual use in Western Europe next to "Great Paul" is that at Ronen, which weighs 16 tons 1 cwt. The great bell at Olmutz weighs 17 tons 18 cwt., and that of Vienna (cast in 1711) within 4 cwt. of this. Russia is the country, *par excellence*, of stupendous bells; but the "Czar Kolokol," or King of Bells, 20 feet high and 20 $\frac{1}{2}$ feet in diameter, and weighing nearly 200 tons, lay cracked and useless up to the year 1837, through the fire which caused its fall exactly 100 years previously. It was then made to serve as the dome of a church which was formed by an excavation beneath it, and still so remains. The "New Bell," however, very nearly as large, was cast in 1817, and hangs in a tower near to the "Czar." It is obviously impossible to ring such bells as these, in the legitimate sense of moving the bell itself; but in the case of "Great Paul," she actually swings on gudgeons, like any of her Lilliputian brethren in an ordinary church belfry. Another branch of the subject is treated under CARILLON.

BELL, ANDREW, D.D., a clergyman of the Church of England, whose name is honorably associated with the progress of education in the beginning of the present century, was born at St. Andrews, March, 1753. He was educated at the college of that town, and after a stay of a few years in America he returned to Scotland in 1781, entered holy orders, and became pastor of the Episcopal chapel at Leith. He soon after proceeded to India, and in 1788 was appointed one of the chaplains at Fort St. George, Madras. An asylum having been established for the orphan children of the European soldiers employed by the East India Company, he organized it, and conducted its affairs for six years, watching over its interest with more than paternal solicitude. A scarcity of teachers led him to introduce the monitorial system, by which the elder scholars became teachers of those who were younger. In 1796 he returned to England, and in the following year published a pamphlet entitled "An Experiment in Education made at the Male Asylum, Madras." The system here explained was adopted by Joseph Lancaster, a dissenter who opened a free school in London in 1798, which was conducted on this plan. Lancaster attracted considerable attention to his efforts, and the British and Foreign School

Society was called into existence, which became very successful. The clergy of the Church of England, becoming alarmed, founded another society, entitled the Church and National Society, of which Bell became the champion; and the friends of education became divided into rival parties, the followers of Bell advocating the teaching of church principles, and those of Lancaster an unsectarian system. The spirit of emulation thus aroused led to the spread of education, and experience soon proved the necessity of introducing important modifications into the monitorial system of teaching. It is now theoretically universally condemned, since the most rudimentary consideration of the subject will show that a good teacher must be a specially trained person, and not a pupil in course of training. On the practical side, however, as regards convenience and immediate saving of money, it offers too many temptations to be quickly abandoned. A correct scheme of national education by qualified teachers would give most valuable results, but its cost would be treble or quadruple of the "pupil teacher" system. Yet notwithstanding this, every foreign government has at times examined and invariably rejected the cheaper English scheme.

Dr. Bell was afterwards appointed master of Sherborn Hospital, Durham, and prebendary of Westminster. He died at Cheltenham, 28th January, 1832, and was buried at Westminster Abbey. His large fortune, which amounted to upwards of £120,000, was bequeathed to trustees to be employed in the spread of education, and he desired that the inscription to be placed upon his tomb should be simply "The author of the Madras System of Education."

BELL BOOK, and CANDLE. In the ceremony of the greater excommunication as practised in the Church of Rome since the eighth century, after the reading of the sentence by the clergy the bell is rung, the book closed, and a candle extinguished; the effect being to exclude the excommunicated from the society of the faithful, divine service, and the sacraments.

BELL, SIR CHARLES, was born at Edinburgh in 1774. At the High School of Edinburgh he made no marked figure. It was under the eye of his brother, John Bell, whose profession he had adopted, that he first gave evidence of his great talents, and in the year 1804, at the age of thirty, he removed to London.

In 1814 he was appointed surgeon to the Middlesex Hospital, an institution which he subsequently raised to the highest repute, and which he justly boasts, in 1836, of leaving "with full wards, and £120,000 in the funds."

In 1821 Bell produced his first well-known paper on the "Nervous System," before the Royal Society, and excited immediate and wide attention. Before the time of Bell all nerves were held to be alike in character, and were considered simply to give more or less nervous susceptibility to any organ, in proportion to the numbers in which they were there distributed. Bell discovered, and showed, that the nerves were naturally distinguished among themselves and clearly classified; and that the nerves of sense (whether peculiar or general), and those of motion, were totally distinct in their character and origin. On cutting a spinal nerve, the older anatomists found both feeling and motion to be lost by the part which is thence supplied with nervous energy, and they concluded that the nerve carried both qualities conjointly. But Bell looked deeper into the matter, and he was rewarded by the discovery that the two roots, by which the spinal nerves are connected with the vertebral medulla, derive and bear from them different qualities—the anterior root conveying the motor power, and the posterior that of sensation, or the sensor power. Following up his inquiries he discovered, likewise, the special nerve of respiration, and others with particular qualities, as to which before his time not even a conjecture had been made.

In 1824 he became lecturer to the London College of

Surgeons. His lectures formed the basis of a work entitled "Animal Mechanics," published in 1828-29. The "Bridge-water Treatise on the Hand," and "Illustrations of Paley's Natural Theology," quickly followed. On the accession of William IV. he was one of those selected for the honour of knighthood with Herschel, Brewster, and others.

Sir Charles Bell removed to Edinburgh in 1836, having been absent thirty-two years. His opening lecture as Surgical Professor was brilliantly attended by professional and non-professional men of eminence; but he soon found that Edinburgh was not the field in which he could work out his experimental projects; and the only great work which he finished there was a new edition of his "Anatomy of Expression." In the summer of 1842 Sir Charles therefore set out on a journey to London. He reached the seat of Mr. Holland, of Hallow Park, on the 27th of May, where he died on the night of his arrival. His death was not altogether unexpected, as he had recently suffered much from *angina pectoris*.

BELL, HENRY, the first man in Europe who successfully applied steam to the purposes of navigation, was born in 1767 at Torphichen in Linlithgowshire. He was educated at the parish school, and afterwards worked as a stone-mason and mill-wright. In 1787 he engaged himself with Mr. Inglis, engineer at Bellshill, and afterwards went to London, where he was employed by the celebrated Rennie. In 1808 he removed to Helensburgh, on the Frith of Clyde, where he pursued his mechanical schemes, while his wife managed the Baths Inn. After engaging in a number of unsuccessful projects his attention was directed, by the experiments of Miller of Dalswinton, to the subject of steam navigation; and in 1812 a vessel, 40 feet long, was built from his plans, called the *Comet*, which was propelled by means of paddles worked by a steam engine of 3 horse power. Robert Fulton, a Scottish engineer, had five years previously placed the first steamboat on the Hudson, in America, but there is no good ground for supposing that Bell had learned anything of Fulton's plans at the time he was proceeding with his own. On the contrary, there is little doubt that Fulton had received material assistance in the construction of his vessel from Bell. A subscription was made by the citizens of Glasgow to relieve Bell of his financial embarrassments, and he received a grant of £200 from the government and an annuity of £200 from the trustees of the river Clyde. He died at Helensburgh in 1830, and a monument of polished granite is erected there to his memory. The trustees continued one-half of his pension to his widow, and a monument was erected to his memory at Dunglass Point, on the Clyde.

BELL, JOHN, an eminent surgeon and anatomist, the first who successfully applied, in Scotland, the science of anatomy to practical surgery, was born in Edinburgh in 1763, and died of dropsy at Rome in 1820.

John Bell was educated at the High School of Edinburgh, and finished his medical education in the university, which then stood very high, ranking among its professors Black, Cullen, and the second Monro. At that time there was scarcely any private teaching or means of cultivating anatomy by private dissections. This deficiency was supplied by Bell, who, in 1790, opened a private school in Surgeons' Square, and began that system of extra-academical teaching which, though it at first got him many enemies, has not a little contributed to the reputation of Edinburgh as a school of medicine. His lectures were devoted to the application of the principles of anatomy to surgery, and obtained for him a great reputation. He however made many enemies, and, being excluded from the office of surgeon to the Edinburgh Infirmary, he found himself obliged to close his school.

In 1793 Mr. Bell published the first volume of his "Anatomy," consisting of a description of the bones, muscles, and joints. In a short time afterwards the

second volume was published, containing the anatomy of the heart and arteries. The work was afterwards completed by his brother Charles. His next work was on surgery, entitled "Discourses on the Nature and Cure of Wounds," in two small volumes 8vo. The "Principles of Surgery," in three volumes 4to, was his next and his greatest undertaking; and his last production is the "Letters on Professional Character and Education," addressed to Dr. Gregory.

A work published after his death on Italy shows that his talent for general literature, had it been exclusively cultivated, would have made him at least as eminent as his professional attainments have rendered him.

BELL ROCK or INCHECAPE ROCK, on the east coast of Scotland, lies at the opening of the bay formed by the Red Head in Forfarshire and Fifeness, and nearly opposite the entrance of the Tay. It is 12 miles S.E. of Arbroath. The rock is dry for about half a mile at low-water spring-tides; its average breadth is about 200 yards.

A lighthouse was erected on this rock in 1811. There are two bells, which in thick foggy weather are tolled by machinery night and day, at intervals of half a minute. Prior to the erection of the lighthouse many wrecks took place annually on this rock, which was the more dangerous from having deep water all around it. The lighthouse is 115 feet high, 42 feet in diameter at the base, and 23 feet at the top; and is solid for the first 30 feet upwards, 15 of them being under water at high tides. The structure altogether cost £60,000. The name Bell Rock refers to an old tradition made popular by Southey's well-known ballad "The Inchcape Rock."

BELLAC, a town of France, in the department of Vienne Haute, stands on the slope of a steep hill above the Vinçon, a feeder of the Gartempe, 21 miles N. by W. of Limoges, and has a civil tribunal, manufactures of linen, paper, woollen cloth, blankets, hats, and leather, and 3700 inhabitants. Not far from the town there is a Druidical monument, consisting of five immense stone blocks surmounted by an enormous slab. The court-house and guard-house of Bellac are formed out of a portion of the old castle built by Boson le Vieux in the tenth century.

BELLADONNA. See *ATROPA*.

BELLADON'NA LILY ("fair lady" lily), a name given in Italy to *Amurellis Belladonna*, and so called on account of its beauty and delicate-blushing flowers. It is found wild at the Cape of Good Hope, has become naturalized in the ditches of Madeira, and is not uncommon in the gardens of England, where it lives for many years without shelter, if planted on a sunny border well protected from wet in winter. See *AMURELLIDACEÆ*.

BELL-ANIMALCULE (*Vorticella*) belongs to the ciliate section of the class INFUSORIA. These beautiful animalcules may be found in ponds attached by a long delicate stalk or "pedicle" to water-plants, and sometimes even to the limbs of aquatic Crustacea. The body has the shape of a bell with a projecting rim, and closed in at the top by a disc-like cover. Inside the edge, and separating the rim from the disc, is a groove or depression which at one point deepens and leads into the *oesophagus* or gullet, a narrow tube which leads directly into the central substance of the body. Structurally the body consists of a single cell composed of *protoplasm*. The outer layer is thin and transparent, and forms a membrane or *cuticle*. Within this is the *cortical layer*, which is firm and granular; this layer passes gradually into a softer and more fluid substance composing the central mass of the body. In the cortical layer, and just beneath the disc, is seen a clear space called the *contractile vacuole*, which expands and contracts at regular intervals. Its function is probably excretory. The *nucleus* is an elongated body situated in the cortical layer. In the midst of the central mass of the body several little round spaces may be seen, each containing particles of food.

When the contents of these food-vacuoles are digested, an opening is made in the groove of the body for the expulsion of the refuse. The stalk consists of two layers, the outermost of which is continuous with the cuticle of the body. The central portion of the stalk is generally surrounded with granules, and is continuous with the cortical layer of the body. The disc is fringed with numerous little hairs or *cilia*. These cilia, by their regular and rapid movements, cause constant currents of water to flow into the gullet. Minute animals and plants are caught in these whirlpools and swept into the centre of the body. The whole body of the bell-animalcule is capable of contraction, and this it does often without any apparent stimulation. The stalk coils up spirally, twisting into a cork-screw shape; the disc retracts, and the body assumes a pear-like shape. The bell-animalcules usually live in colonies, numerous individuals being attached to the same foreign body.

Reproduction may be effected in several different ways. Sometimes the bell-shaped body is split down the middle from the disc to the stalk; the two halves are then supported on the same stalk, and each acquires the structure previously possessed by the whole. On one of these two portions at the end of the body nearest the stalk a fringe of cilia is developed in addition to the cilia fringing the disc. This portion is then detached and becomes a free swimming bell. Strangely enough the original fringe of cilia on the disc disappears, and a stalk is developed at this end of the body, while a disc and gullet is formed at the end which was attached to the stalk in the original animal. It appears that a reverse process which Huxley calls "conjugation," sometimes occurs. One of these free swimming bodies, instead of developing a stalk, sometimes attaches itself to an ordinary stalked animal, and becomes so fused with it that the two form one individual. Huxley considers it probable that this "conjugation" has relation to a sexual process. Reproduction may also take place by *gemmation*. The nucleus splits up, and portions are thrown off as buds from the lower extremity of the body.

The bell-animalcule sometimes becomes encysted. "The bell becomes converted into a spheroidal body, in which only the nucleus and the contractile vesicle remain distinguishable. This surrounds itself with a structureless envelope or *cyst*, from which, after remaining at rest for a longer or shorter time, the bell-animalcule may emerge and resume its former state of existence" (Huxley).

BELLARMIN, CARDINAL ROBERT, a famous theologian of the Roman Catholic Church, was born at Monte Pulciano, in Tuscany, 4th October, 1542. He entered the order of Jesuits in 1560, was ordained priest at Ghent by Jansenius in 1769, and elected to the chair of theology at the University of Louvain in 1570. Having occupied this position for six years, he went to Rome in 1576, where he was appointed professor of polemical theology in the new college founded by Gregory XIII. In 1590 he accompanied the pope's legate into France for the purpose of affording the Papal cause the aid of a master of the controversial points of divinity. In 1599 he was made a cardinal, and in 1602 archbishop of Capua. His efforts to reform his clergy were unceasing, and when in 1605 Paul V. wished to have him constantly at Rome as an adviser, he resigned his bishopric. He was made keeper of the Vatican library, and would probably have been elected pope but for his connection with the Society of the Jesuits. He died at Rome 17th September, 1621. The great work of his life was the defence of the Church of Rome against Protestantism, and he possessed, according to Bayle, "the best pen for controversy of any man of his age." His chief work, which contains the substance of his lectures as delivered at Rome, was entitled "*Disputationes de Controversiis Christianæ Fidei adversus hujus temporis hereticos*," and was published at Rome in three volumes in 1581-82.

It exhausted the controversy as it was known in those days, displayed great learning, subtilty of argument, clearness of method and arrangement, and a broad unflinching statement of the theological dogmas of the Roman Catholic Church. His works when published in a collected edition at Cologne in 1619 filled seven folio volumes. Another edition (in five volumes folio) was published at Venice in 1721. He was a man of a pure character, and an ascetic in his mode of life. Attempts have been made by the Jesuits to procure his canonization, but hitherto without success.

BELLARY, a district in the Madras Presidency, British India, lying between 13° 40' and 15° 58' N. lat., and 75° 43' and 78° 19' E. lon. The area is 11,007 square miles, and the population, according to the latest statistics, 1,700,000. The river Tungabhadra bounds it on the north, separating it from the territories of the Nizam; on the east lie the districts of Cuddapah and Kurnool, and on the other two sides stretches Mysore.

The general aspect of the district is a vast surface of treeless plain, broken at rare intervals by granite masses that spring abruptly from the surrounding sheet of black cotton soil like rocks from the sea. Bellary is, in fact, an extensive plateau, tilted up in the west on the shoulders of the Ghats, and sloping down sharply towards the eastern coast. Water is very scarce throughout, and vegetation is accordingly rare. Iron of good quality abounds, and copper, lead, antimony, manganese, and alum are found. Salt and saltpetre are extracted from the soil.

The fauna of the district includes among mammals the tiger, panther, cheetah, wolf, black bear, hyæna, wild boar, antelope, and sambar deer—the first and last being very rare. Among birds the order of Raptores is largely represented—the bustard, florican, pea-fowl, partridge, quail, snipe, goose, and water-fowl afford excellent sport; venomous snakes abound. The flora is scanty—the *babul* (*Acacia arabica*), *bér* (*Zizyphus jujuba*), and wild date (*Elate sylvestris*) being the chief indigenous trees; but in the topes and gardens are found the mango, tamarind, cocoa-nut, palm, banyan, and *nim*.

Among the agricultural products of the district cotton takes the first place. In the raw state it is largely exported both to Madras and Bombay, and the manufacture of cotton goods—cloth, rope, tape, and carpets—occupies a large number of the people. Oil-seeds, sugar-cane, hemp, and indigo are also cultivated. In woollen goods the chief articles of export are the blankets of the Kudlighi *tuluk*, for which there is a demand all over the Presidency. Chintz-stamping still forms an important industry in the Gooty *tuluk*, where also there is a considerable manufacture of glass bangles. Iron-smelting is carried on in the Hospet *tuluk*.

The climate is extremely dry, the average annual rainfall being only 17 inches. Fever exists in an epidemic form. Ophthalmia is common, owing to the dryness of the atmosphere and the glare from the granite rocks.

BELLARY, the chief town of the district, is situated 305 miles from Madras by railway, and contains 52,000 inhabitants. Being the headquarters of the district administration, and of a brigade of the Madras army, Bellary possesses all the public establishments and offices pertaining to a civil and military station of the first class. Situated on an arid plain that stretches from the foot of a mass of granite rock 450 feet in height, and about 2 miles in circuit, the town is defended by two lines of fortifications. The upper fort crowns the rock, and being inaccessible in the face of even the smallest force, may be considered impregnable to assault. The lower fort, containing the arsenal, guards the eastern base. On the site stand several public buildings. Southward is the native quarter, Cowle Bazar, Brucepettah, and Mellorpettah, containing the finest military market in Southern India, and subject to cantonment discipline. A large tank, nearly 8 miles in circumference

when quite full, but which, being very shallow, is as a rule dry for a part of every year, lies on this side of the rock. On the west are grouped the regimental lines, substantial buildings with accommodation for two European and two native regiments. The climate being very dry (in consequence of the winds passing over such an extent of heated plain) Bellary is considered a healthy station; but the heat is great, the mean registered in April being 93°, and the normal annual rainfall amounts to only 16½ inches. There are no local manufactures of importance.

BELL-BIRD (*Chasmorhynchus albus*) belongs to the family Ampelidæ (CHATTERERS) of the order PASSERES. It is a native of Guinea, and derives its name from the similarity of its notes to those of a muffled bell. It measures about 12 inches in length, and is of a white colour; at the base of the bill is a cylindrical, fleshy wattle, clothed with minute white feathers, which is flaccid and pendent when the bird is quiet, but becomes inflated when he is under the influence of any emotion, and then attains a length of 2 inches or more, and a diameter of about a third of an inch at the base. This effect is said to be produced by the impulsion of air, which is afterwards confined in the cavity. The food of this bird consists of fruits and berries, occasionally varied with caterpillars and other soft insects. It lives in the forests, and is a solitary bird.

The name is also applied to two birds inhabiting various parts of Australia.

The Bell-bird of New South Wales (*Mycanthe melanophrys*) is one of the HONEY-EATERS. It has a peculiar faint tinkling note, which has been compared to the sound of distant sheep bells. This note is heard with delight by the traveller as an indication that water is at hand. The bird is about 7 inches in length, and the general colour of the plumage is yellowish olive.

The Crested Bell-bird (*Oreocera gutturalis*), one of the SITTIDS family, extends over the whole southern portion of Australia. It is about 7 inches in length, and of a light-brown colour, with the wings and tail darker. It is found in the open parts of the forest, and passes a good deal of its time on the ground. Its note is described by Gould as a peculiar, mournful piping, and it is also a ventiloquist of great power, its note often sounding as if at a considerable distance, when in reality the bird is perched upon the branch of a neighbouring tree, and then gradually increasing in volume until it appears to be just over the head of the hearer. Its favourite food consists of grubs and caterpillars, in search of which it frequently resorts to newly-ploughed land. The nest of this species is usually placed in a grass gum-tree, and is composed of strips of bark, and lined with dry grass. It lays three eggs, which are generally of a bluish-white colour, speckled or streaked and spotted with black.

BELLEGARDE, a village of France, in the department of Ain, on the Swiss frontier. It is on the railway from Mâcon to Geneva, and is situated at the junction of the Rhone and the Valserine. It is much visited on account of the disappearance of the Rhone ("la Perte du Rhone"), which here flows under a ledge of rock for about 120 yards, and when swollen flows over the rock, so that there is then a fall also.

BELLE-ÎLE-EN-MER (the Roman *Vindilis*), an island on the west coast of France, a little N.W. of the mouth of the Loire, in the department of Morbihan. The island is of an oblong form; its greatest length from N.W. to S.E. is 12 miles, its greatest breadth 6, and it is about 6 miles from the peninsula of Quiberon. It is surrounded by rocks and small islets. The climate is very mild and healthful, and the soil fertile. It abounds in excellent pasturage, and a great number of horses are reared. Many of the inhabitants are engaged in fishing and in the preservation of sardines, pilchards, anchovies, &c. Belle-Île forms a

canton which is divided into four communes—Palais, Bangor, Locmaria, and Sanzon, so called from the chief towns on the island. The total population of the island is 10,000. Belle-Île belonged to Quimper Abbey in the tenth century, and was held by the English in 1761–63. The chief town, Palais—which contains more than half the population of the island—is fortified, and has steamboat communication with Nantes. There is a lighthouse with a fixed light of the first class.

BELLE-ISLE, a small island lying about 15 miles N. of the island of Newfoundland, and about the same distance E. of the coast of Labrador. It is near the middle of the N.E. entrance to the Strait of Belleisle, in 51° 57' N. lat., and 55° 40' W. lon. The island is about 20 miles in circumference. It has a harbour called Lark Harbour, on the N.W. side, capable of receiving only small islands.

BELLE-ISLE, STRAIT OF, a channel between Newfoundland and Labrador, forms the northern entrance from the Atlantic to the Gulf of St. Lawrence. The length of the strait, from its commencement at Belleisle Island to its termination at Grand Point on the Labrador coast, is about 80 miles, and its general width about 12. The navigation is dangerous. The Labrador side is much indented with bays, but the coast of Newfoundland along the strait is without indentations.

BEL'LENDEN, WILLIAM, was of a Scotch family, and became known as a writer in the commencement of the sixteenth century. It is stated that he filled the office of professor of humanity in the University of Paris in 1602, and that he was enabled to reside in that university through the favour of James VI. (James I. of England). In 1608 he published his "*Ciceronis Principes*," &c.—"a singular work," says Dr. Bennett, bishop of Clovne, "in which he extracted from Cicero's writings detached remarks, and compressed them into one regular body containing the rules of monarchical government, with the line of conduct to be adopted and the virtues proper to be encouraged by the prince himself." This treatise, which is called "*De Statu Principis*," he dedicated to Prince Henry, the eldest son of King James. In 1612 he published "*Ciceronis Consul, Senator, Senatusque Romanus*"—that is, "*De Statu Republicæ*,"—in which the nature of the consular office and the constitution of the Roman senate are treated. He also conceived and partly executed the plan of a third work, "*De Statu Præsei Orbis*," which was to contain a history of the progress of religion, government, and philosophy from the times before the Flood to their various degrees of improvement under the Hebrews, Greeks, and Romans. He had proceeded so far as to print a few copies of his work in 1615, when he recalled the few copies of his last work that were abroad, and published the three treatises in 1616 under the title "*Bellendenus de Statu*." Most of the copies of this work were lost at sea, and it consequently became very scarce. The republication of the three original works above named of "*Bellendenus de Statu*" in 1787, with a Latin preface full of fierce political invective against the character and administration of Mr. Pitt, and of unmeasured eulogy of Mr. Burke, Lord North, and Mr. Fox, from the pen of Dr. Parr, has made the name of Bellenden familiar to the English reader.

BELLEROPHON, a prominent figure in the Greek mythology, was son of Glaucus, king of Corinth, and grandson of Sisyphus. His name was Hipponous, but he is better known by the epithet of "Slayer of Bellerus" (*Bellerophon*). It was on flying from Corinth on account of the murder of Bellerus that he took refuge with his friend Prætus, and there met with Antea, to whom he acted the part of Joseph with Potiphar's wife. Prætus, believing his wife's tale, sent Bellerophon to Jobates, king of Lycia, with a sealed letter of introduction—the letter really containing, however, instructions for the death of the young man. Lycia was ravaged by Chimæra, a fire-breathing

monster, with the shoulders of a lion, the middle of a goat, and ending with the tail of a dragon; three heads, too, had this monster, one of each of the three animals named. By favour of Athena, Bellerophon obtained possession of the winged horse PEGASUS, catching him with the goddess's bridle while he was drinking at the well Pirene. On Pegasus Bellerophon rose into the air, whence he killed Chimæra with his arrows. Jobates had set him upon this enterprise hoping he would fail; he now entrapped him by an ambush, but all the spies were slain. Finally, yielding to fate, the king gave Bellerophon his daughter to wife. Homer says that Bellerophon became melancholy, and, himself feeling god-forsaken, abandoned the society of men. Later poets declared that this was because he had attempted to scale heaven on Pegasus, when he was thrown to earth by the horse, stung by a gadfly sent from Zeus himself.

BELLER'OPHON is a genus of fossil shells, rich in species, which occur exclusively in the Paleozoic formations, as in the Silurian strata, Devonian rocks, and mountain limestone. It has been generally referred to Cephalopoda, and considered analogous to the living Argonauta. But its true place is now held to be among the GASTEROPODA, standing near Atlanta, and forming a genus of the family Atlantidae, order HETEROPODA. The shell is symmetrical, spherical or disc-shaped, and convoluted, having but few whorls, which may be either smooth or sculptured; the convex margin has a dorsal keel. The aperture is generally notched on the dorsal side. The genus is distributed over North America, Europe, Australia, and India.

BELLES LETTRES, a vague term used by the French, which has been adopted by other nations, to signify various lighter branches of knowledge which are the produce of the imagination and taste rather than of serious study and reflection. Belles lettres may be said to answer to the *literæ humaniores* of the Latin language, and to the English expression "polite literature." Criticism forms the bulk of *belles lettres*; "books upon books," and fugitive verses, detached essays, fragments of history, all that is light and entertaining, even frivolous sometimes, as opposed to the more serious works in literature, come under this term.

BELLEVILLE, a suburb in the north-east of Paris, which contains several large manufactories, and is chiefly inhabited by the working classes. It was the stronghold of the Communists in 1871. From the park of Buttes Chaumont there is a fine view over Paris, and it is a very favourite resort of the humbler class of pleasure-seekers. Paris derives its chief water supply from springs at Belleville.

BELLE'VILLE, the capital of the county of St. Clair, Illinois, United States, about 14 miles S.E. of St. Louis. It stands on an eminence in the midst of a fertile district, and has a good trade. The town contains breweries, flour-mills, distilleries, foundries, and has some good public buildings. The population in 1880 was 10,683, the majority of whom are Germans.

BELLEY, a town of France, in the department of Ain, is situated near the Rhone, 39 miles E. of Lyons, is the seat of a bishopric, founded in 412, and has a cathedral, public library, tribunal of first instance, a college, and 4000 inhabitants. There are manufactures of silk and muslin, and in the neighbourhood excellent lithographic stones are found. The town is of great antiquity, and there are the remains of a Roman temple.

BELL-FLOWER. See CAMPANULACEÆ.

BELLIG'ERENT (from *bellum*, war; and *gero*, to wage), a nation, power, or country carrying on war.

BELLI'NI, GENTILE, the eldest son of Jacopo Bellini, one of the earliest practitioners in oil painting, was born at Venice in 1421. He was employed, in conjunction with his greater brother Giovanni, to decorate the council chamber of the Venetian doge's palace. Some of Bellini's pictures were taken by commercial speculators to Constan-

tinople, and Mohammed II. sent Bellini an invitation. He was courteously received by the sultan, who sat to him for his portrait. Among other works painted for the sultan was the "Beheading of St. John." This was greatly admired by Mohammed, who pointed out, nevertheless, some inaccuracy in the marking of the dis severed neck; and, in order to prove the justice of his criticism, he ordered the head of a slave to be struck off in the presence of the astonished artist. From this moment Bellini never enjoyed an hour's tranquillity until he had obtained leave to return to Venice. Mohammed dismissed him with many marks of favour, placing a gold chain round his neck, and giving him letters to the Venetian senate expressive of his satisfaction. He was engaged in various public works after his return to Venice, for which he was requited by the republic with an honourable pension for life, and the order of St. Mark. He died in 1501.

BELLI'NI, GIOVAN'NI, the son of Jacopo, and the brother of Gentile Bellini, was born at Venice in 1422. He contributed perhaps more than any painter of his time to emancipate art from the dry Gothic manner of his predecessors. Giovanni ornamented the public edifices and churches of Venice and other cities of Italy with a prodigious number of paintings, and continued his labours to a very advanced age. A few of his small pictures are to be found in England; but it is only by his large works in Italy that an adequate idea of his powers can be formed. He died in 1512.

BELLI'NI, VINCEN'ZO, a modern musical composer of considerable celebrity, was the son of an organist, and was born in 1806, at Catania, in Sicily. Bellini was educated in the Conservatorio at Naples, under Zingarelli, and in that city, before he had completed his twentieth year, he produced an opera, "Bianca e Fernando," at the Theatre San Carlo. The following year he wrote, for the Scala at Milan, "Il Pirata;" and this was succeeded by "La Straniera" at the same place; "La Sonnambula" (his masterpiece) at Naples; "I Capuletti ed i Montecchi" at Venice; "Norma" (a work still holding the stage) at Milan; "I Puritani" for the Theatre Italien at Paris, &c. He died in 1835 of dysentery from overwork, aged but twenty-nine. Bellini's moral character stood high, and his manners and compositions were in strict accordance—agreeable, tender, and elegant. He rarely attempted the brilliant, and never aspired to the sublime, or even the lofty. A sweetness of melody, a fitness of harmony, and an adaptation of the sound to the sense, more frequent than with most of the opera writers of the early part of the century, characterize all his works. The subjects he chose were interesting, and placed before the public by a body of actors and singers who were able and willing to do them every possible justice. Bellini may be regarded as a brilliant follower of Rossini; and it says much for the nobility of soul of the greater and older artist, that he helped Bellini during his short career with unvarying kindness.

BELLINZO'NA, a walled town in the canton of Ticino, Switzerland, is situated on two hills, one on each side of the Ticino at the entrance of the Riviera Valley. It is 8 miles from the head of the Lago Maggiore, on the high-road of the St. Gothard, has a very fine church, a college, an arsenal, and 2500 inhabitants. There are several ruined feudal castles in the neighbourhood. It is the seat of the cantonal government for six years alternately with Locarno and Lugano. In former times it was a place of great military importance, as its castles completely defended the valley in which it is situated, and it was regarded as the key from Lombardy to Germany. It has been the scene of many conflicts between the Swiss and the Italians. The town is protected from the overflowing of the Ticino by a dam more than 2400 feet long. The river is crossed by a bridge of ten arches upwards of 700 feet in length.

BELL-METAL. See ALLOY.

BELLO'NA, the goddess of war among the Romans, in all probability a Sabine divinity, always mentioned as a companion of Mars, often as his sister or his wife. She corresponds in some measure with Enyo of the Greeks. Bellona, originally Duellona (see the article on the letter B), is a feminine adjective, which with the noun *dea* signifies the goddess of war (from *bellum*, war).

A principle which pervades the Roman mythology is the division of each object of fear or desire between deities of either sex. So also Dianus, or Janus, the Roman god of light until the Greek Apollo usurped this character, had for counterpart Diana, the goddess of light or the moon (from *dies*, day). Besides Dianus and Diana, there occur Vulcanus and Vesta, the god and goddess of fire, &c. In the same way they had Mars, together with Bellona, to preside over war.

The temple of Bellona was founded by App. Claudius Cæcens, B.C. 296, during the Samnite wars. The priests wounded themselves in offering sacrifice. The goddess was usually represented as wearing a helmet, and bearing a shield in one hand, in the other a firebrand, a spear, or a bloody scourge. Sometimes she was blowing a trumpet, or uttering a war-cry and rushing to the combat. Her image is very frequently seen on the coins of the Bruttii.

BELLOT, JOSEPH RENÉ, a French naval officer and distinguished Arctic explorer, was born at Paris 18th March, 1826. In May, 1851, he went as a volunteer in the expedition sent out to search for Sir John Franklin, sailing in the *Prince Albert*, commanded by Captain Kennedy. During this voyage he discovered the strait named after him. He went a second time with Captain Inglefield in H.M.S. *Phœnix*; but on the 21st March, 1853, he was killed by being carried by a violent gust of wind into a crack in the ice. His "Journal of a Voyage to the Polar Seas made in search of Sir John Franklin, in 1851-52," was published, with a memoir of his life, at Paris (two vols. 1854). An English translation was published at London in 1855.

BELLOWS. See BLOWING MACHINES.

BELLOWS-FISH. See TRUMPET-FISH.

BELLS, on shipboard, are used as a substitute for clocks. A ship's bell is usually hung at the beam of the fore-castle, but sometimes to a beam near the mizen-mast. Time is divided into watches or periods, usually of four hours each, and each half-hour is marked by striking the bell. The number of strokes depends on the number of half-hours elapsed during that particular watch, and not on the hour or time, as in ordinary reckoning.

BELLU'NO (the ancient *Belunum*) is the capital of a province of Northern Italy, and stands on a hill between the Ardo and the Biave, which here unite. It is the seat of the Bishop of Belluno-Feltre. The town is well built, has a handsome cathedral, and is adorned with several marble fountains. A massive campanile, 216 feet in height, commands a beautiful prospect. It has a gymnasium, several elementary schools, and a good public library. Water is supplied from the neighbouring hills by means of an aqueduct. There are manufactures of silk, wax, leather, and pottery, and a good trade in wood. The population in 1882 was 15,935.

BELO'IT, a city in Wisconsin, United States, on the Rock River, 40 miles S. of Madison. It is built upon two plains, one rising abruptly 60 or 70 feet from the other, and is regularly laid out with broad streets ornamented with fine trees, and surrounded by fertile prairies, interspersed with groves of timber. The city was incorporated in 1856, and contains some fine churches and schools, and is the seat of Beloit College, well endowed and very flourishing. There are various manufactures, and the town is connected by railway both with the Mississippi and Lake Michigan. The population in 1880 was 4790.

BELOO'CHISTAN. See BALUCHISTAN.

BEL'PER, a market-town in Derbyshire, is situated on the east bank of the Derwent, 7 miles N. of Derby, and 134 from London by the Midland Railway. The name is a corruption of the French *Beau-repaire* (beautiful retreat). The prosperity of Belper is of modern date, and is principally owing to the establishment of large cotton works by the Strutt family, one of whom is Lord Belper. The town is now one of the most flourishing in Derbyshire, and in addition to its cotton mills there are manufactures of cotton and silk, hosiery, and gloves, and an iron foundry. The older buildings form a very small part of the place, which consists chiefly of modern houses, with neat exteriors, while flower-gardens, orchards, and plantations are fast spreading over the rising-grounds about the town. Griststone, which the neighbourhood furnishes of excellent quality, is much used in building. The ancient chapel being too small for the increased population of the place, a new church has been erected on a bold elevation above the town, and from its situation and architecture, which is of the florid English style, is a great ornament to the place. There is another modern church, and places of worship for Unitarians, Independents, General and Particular Baptists, and Wesleyan and Primitive Methodists. The union workhouse is a fine specimen of Elizabethan architecture. A cemetery, 15 acres in extent, was laid out in 1860, on a slope above the Derwent. The population of Belper in 1881 was 9875. The surrounding scenery is very beautiful and picturesque.

BEL'SHAM, THOMAS, was born at Bedford in 1750. His father, the Rev. James Belsham, was a man of classical attainments. He was educated at the Dissenters' Academy at Daventry, in which he became assistant tutor, and subsequently head of the institution, which office he filled from 1781 to 1789. He was also the minister of the Society of Protestant Dissenters at Daventry, and he might probably have continued in these capacities during the remainder of his life but for a change which took place in his religious opinions. He had been educated in the doctrines of Calvinism, but having embraced Unitarianism he relinquished his connection both with the academy and with his congregation. About this time, a new college being established at Hackney by those Dissenters who were friendly to unrestrained religious inquiry, it was placed under the direction of Mr. Belsham, but in a few years it sunk, for want of funds to support it. Before this event took place he was chosen to the vacant pulpit of Dr. Priestley, by the Gravel Pit congregation. Eleven years afterwards, in 1805, on the death of Dr. Disney, the colleague and successor of Mr. Lindsey, Mr. Belsham removed to Essex Street Chapel, London, of which he continued the pastor during the remainder of his life.

From the time that Mr. Belsham avowed his conversion to the doctrines held by the Unitarians, he espoused their cause with great zeal, and advanced it by applying his talents and learning to its defence. There is hardly any branch of theology, or of the doctrines or evidences of revelation, on which Mr. Belsham did not publish his thoughts. But Mr. Belsham's literary works were not exclusively theological. In 1801 he published "Elements of the Philosophy of the Human Mind and of Moral Philosophy." As a follower of Hartley, he resolved all mental phenomena into the association of ideas. He died at Hampstead, 11th November, 1829.

BELSHAZ'ZAR, viceroy of Babylon, and son of Nabonetus, the last king of Babylonia. He perished, B.C. 538 or 537, on the night when Babylon was stormed by Cyrus, who drew off the waters of the Euphrates and marched his troops through its channel while the inhabitants were celebrating a festival. This account, contained in the Book of Daniel, is confirmed by Xenophon and other ancient historians. Nabonetus, contrary to the usual custom, admitted Belshazzar to a share in the government.

There were thus two kings of Babylon at this time, and it is evident that the writer of the Book of Daniel was acquainted with this fact, though he does not mention it, from chap. v. 7, 16, 29, where among the rewards offered is that of being made the *third* ruler in the kingdom.

The history of Belshazzar has been a favourite subject for poets and artists: the painting of Belshazzar's feast by Martin, and the dramas of Milman and Hannah More on this subject, are well known. See also BABYLONIA.

BELT, which in Danish, as in English, means a girdle, is the name given to two of the three straits which lead from the Cattegat to the Baltic Sea. The three straits are the SOUND, the Great Belt, and the Little Belt.

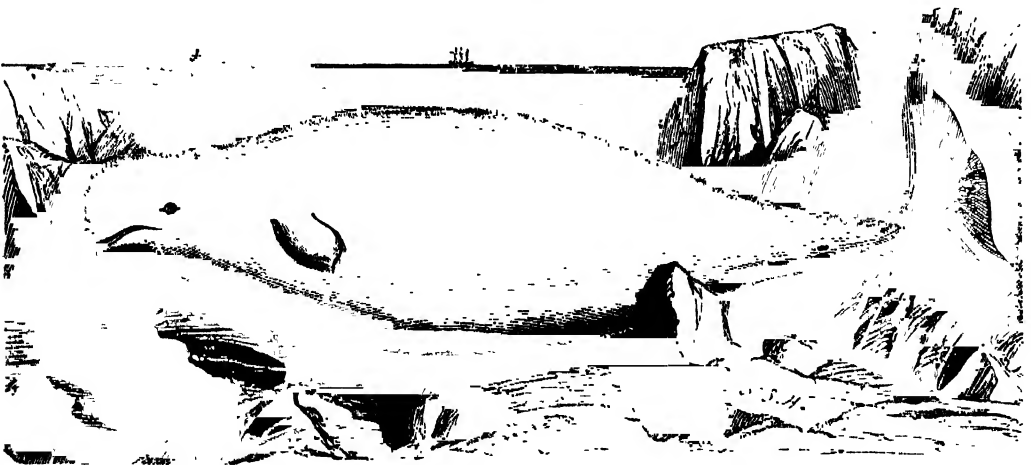
The *Great Belt*, in its northern part, separates the islands of Zealand and Funen, and is about 12 miles wide; but at its southern extremity it is divided into two straits by the island of Langeland. The eastern one of these, between Langeland and Laaland, is about 8 miles wide; the western one, between Langeland and the island of Taasinge, is only half as wide. The whole length of the Great Belt is about 70 miles. The depth of water varies from 5 to 25 fathoms. The navigation is dangerous, owing to numerous shoals and small low islands.

The *Little Belt*, in its northern part, separates Jutland from the isle of Funen, and in its southern part extends between the islands of Aroe and Alsén. Its whole length is about 80 miles. Its breadth is very variable. At its northern entrance, opposite Fredericia, it is only a mile wide; a little further south, at Middlefahrt, the width is only half a mile; between Aroe and Alsén the breadth is about 8 miles. The depth varies from 4 to 27 fathoms, and the navigation is more dangerous than that of the Great Belt, owing to similar causes. There is a current through these straits from the Baltic towards the German Ocean, but the passage through the Sound is usually preferred by large vessels.

BELTEIN or **BEL'TANE**, the name of a kind of festival, formerly observed in Ireland and Scotland, in most places on the 1st of May. In some parts of the

west of Scotland it was observed on St. Peter's Day, 29th June. In Ireland we find two belteins, one on the 1st of May, the other on the 21st of June. To the beltein also, in all probability, the fires which were formerly lighted in some parts of England on Midsummer Eve are to be referred. Beltein, it has been alleged, signifies the fire of Baal, the worship of whom is supposed to have existed in England, Scotland, and Ireland in the remotest period of Druidical superstition. The Phœnician Baal denoted the Sun, as Ashtaroth did the Moon. Beltein was therefore the fire lighted in honour of the Sun, whose return and visible influence upon the productions of the earth was thus celebrated. *La na Beal tina* and *neen na Beal tina*, in the Irish language, are the day and the eve of Beal's fire. The earliest account of beltein is that given by Cormac, archbishop of Cashel, about the year 908, who speaks of two fires being kindled near each other, and the cattle being driven between them—the men also passing between them as a means of insuring health. At the beginning of the eighteenth century the ceremony was observed in the Highlands of Scotland on the 1st May. A feast was held in the open air, and a cake baked on the embers of the fire was used as a means of drawing lots, the person on whom the lot fell being required to leap three times through the flames of the fire, in order to bring good luck for the ensuing year. The observance of beltein in the British isles at a remote period, shows how widespread the practice of fire-worship in primeval times must have been. In almost every land traces of it appear, and the still prevailing custom of lighting *bonfires* is only a relic of the old superstition. The practice of lighting fires on Midsummer Eve in England, in honour of the summer solstice, is fully illustrated by Brand, in his "Popular Antiquities," vol. i. p. 238 et seq. Bonfires were also pretty generally lighted in Great Britain on 1st November, as a testimony of thankfulness for the newly gathered harvest.

BELTUR BET, a small town in the county of Cavan, Ireland, is situated on the eastern bank of the river Erne, about half-way between Lough Oughter and Lough Erne.



The Northern Beluga (*Deluga leucas*).

It is 11 miles from Cavan and 96 from Dublin, being 5 miles from the Belturbet junction on the Cavan and Clones branch of the Midland Great Western Railway. Barges convey coals, timber, &c., on the Erne, when the waters are high, from Belleek up to Belturbet. The town contains Protestant and Roman Catholic churches, a Methodist meeting-house, and several schools. It is irregularly built, but has a good market, and is a thriving place, the chief

business carried on being in corn and distilling. The population in 1881 was 1807.

BELUGA is a genus of CETACEA belonging to the DOLPHIN family. The northern beluga or white whale (*Beluga leucas*) derives its name from the uniformly white colour of the skin. It is an inhabitant of the northern seas generally, being especially numerous off the coast of Greenland, and in Hudson's Bay and Davis'

Strait. It forms an extremely striking object, and is remarkable for its elegant symmetry and for its activity. It is gregarious and follows ships, herding in numbers to the extent of forty or fifty individuals, which are seen gracefully tumbling above and below the ocean's surface. Two examples have been captured off the British coast. One of these was seen in the Medway in 1816, and it was subsequently shot near Upnor Castle. It measured rather more than 13 feet in length. The other was killed in the Frith of Forth, near Stirling, on the 6th June, 1815. This whale was supposed to run up the river in pursuit of salmon, and it was at last killed by the salmon-fishers near the Abbey of Culmuskenneth. It was a male specimen, and measured 13 feet 4 inches in length. The flesh of the beluga is considered good eating by the Greenlanders, whilst the oil is still more highly extolled. The skin is made into leather. Neither the male nor the female exhibit any dorsal fin. The dam usually produces two young at a birth, the suckers having at first a bluish-gray colour. There are teeth in both jaws, but the small conical teeth in the front of the jaws frequently drop out in maturity.

BELVEDERE, in architecture, is a small building constructed at the top of a house or palace, and open to the air at least on one side, and often on all. The term is an Italian compound, signifying "a fine view;" and in Italy it is constructed expressly for that purpose, combined with the object of enjoying the cool evening breeze. The most celebrated construction of this kind at Rome, which is in the Vatican, was built by Bramante in that part called the Court of the Belvedere. It contains the famous antique Apollo (APOLLO BELVEDERE). Belvederes are not uncommon in France; but the term is applied rather to a summer-house in a park or garden, than to the constructions on the tops of houses.

BELZO'NI, GIOVAN'NI, was a native of Padua. He was the son of a barber, and was born in 1778. He passed his early youth at Rome, where he intended to enter the monastic life, but in the year 1800 he left Italy, and visited in succession several parts of Europe. In 1803 he arrived in England, where he soon after married; and after nine years' residence in England, during part of which he gained his living by exhibiting feats of strength, he set off with his wife for Portugal and Spain, from whence, in 1815, he proceeded to Egypt to construct a hydraulic machine for irrigation; but this, owing to the prejudice of the natives, was abandoned before it was completed. Belzoni was employed by the British consul to remove the colossal bust, commonly, but incorrectly, called the Young Memnon, which he accomplished with great ingenuity, shipped it in a barge which sailed down to Rosetta, and thence to Alexandria, where it was shipped for England. It is now in the British Museum. He was the first to open the great temple of Abousambul, or Ipsambul, which is cut in the side of a mountain, and the front of which was so much encumbered by the accumulated sand that only the upper part of it was visible. In 1817 Belzoni made a second journey into Upper Egypt and Nubia, during which he made excavations at Carnak, on the eastern side of the Nile, and found there a colossal head of granite, several statues, an altar with basso-relievi, sphinxes, &c. But one of the greatest discoveries of this enterprising traveller was the opening of a splendid tomb in the Behn el Molouk, or Valley of the Tombs of the Kings. He found out by guess the right entrance, which had been blocked up for many centuries, had it cleared, and at last made his way into the sepulchral chambers cut in the calcareous rock, and richly adorned with pictures in low relief and hieroglyphics painted in the brightest colours. He also discovered the entrance into the second great pyramid of Ghizeh, and penetrated into the central chamber, the existence of which was before unknown to Europeans, though it

appeared from an inscription found there that it had been entered by the Arabs. In 1818 he discovered the ruins of Berenice, &c. At last, in September, 1819, he left Egypt, owing to an attempt having been made upon his life.

On his arrival in England he published his "Narrative of the Operations and Recent Discoveries within the Pyramids, Temples, Tombs, and Excavations in Egypt and Nubia" (4to, London, 1820, with an atlas). In 1823 he set off once more for Africa, with the intention of penetrating to the city of Timbuctoo, the object of so many unsuccessful attempts, but he died on the 3rd of December, 1823, at a place called Gato, in the kingdom of Benin. He was buried there under a large tree, and a simple inscription was placed on his tomb.

BEMBEX, a genus of hymenopterous insects, forming the typical group of the Bembeceide, a family of the Fossorites. The species are peculiar to hot climates, and in some instances much resemble wasps in size and colour. One species, *Bembex rostrata*, is found in the south of Europe. The females form oblique cylindrical burrows in sandy banks, with a cell at the bottom of each. "The little miners," says Bates, "excavate with their fore feet, which are strongly built and furnished with a fringe of stiff bristles; they work with wonderful rapidity, and the sand thrown out beneath their bodies issues in continuous streams." When her burrow is constructed the female collects various flies as food to her young, darting in chase of them with astonishing rapidity. Having deposited five or six flies in a cell, she lays in it a single egg, closes the mouth of the burrow, and proceeds in the same manner with another cell. The larva, when hatched, begins to feed upon the imprisoned flies, which serve till it assumes the pupa state, after which it soon changes to a perfect insect. Though not strictly social, yet these insects are apt to form their burrows in the immediate neighbourhood of each other; the association being of course between individuals of the same species. The burrow of the Bembex, artfully as it is closed, is liable to invasion. A beautiful insect, *Panorpes carnea*, is enabled, by the spired structure of its legs, to force an entrance, which it does with the tail foremost; it then deposits an egg, which hatches in the following spring, and the larva of the Bembex then becomes the prey of that of the *Panorpes*.

BEM'BO, PIETRO, CARDINAL, a celebrated Italian author, was born in Venice 20th May, 1470. His education commenced at Florence, was continued at Venice and Messina, and completed at Padua. He adopted the ecclesiastical profession, and, devoting himself to the study of poetry and polite literature, soon gained considerable reputation, and in 1498 the support and patronage of the Duke of Ferrara. In 1506 he went to Urbino, where he resided until 1512, when, on the death of his patrons there (the Duke of Montefeltro and his wife, the Duchess Elizabeth Gonzaga), he accompanied his friend, Julian de' Medici, to Rome. He there received the appointment of private secretary to the pope, Leo X. (John de' Medici), an office which he retained until the death of that pontiff. He afterwards retired to Padua, where he produced a work on the Tuscan dialect entitled "Prose," and in 1529 was appointed historiographer to the Venetian Republic and keeper of the library of St. Mark's. Here he laboured, by command of the Council of Ten, on a continuation of Sabellius's "History of Venice," which was published after his death with the title "Historiæ Venetæ Libri XII." In 1539 he was raised by Paul III. to the rank of cardinal, and took up his residence again in Rome, being subsequently appointed to the bishoprics of Gubbio and Bergamo. He died 18th January, 1547. A simple stone in the pavement of the church of S. Maria sopra Minerva, Rome, marks his resting-place. His merits as a writer are chiefly those of a purist in style. He composed Latin in imitation of Cicero, verse in the manner of Petrarch, and prose in the style of Boccaccio—all three with admirable

ingenuity and taste. He is said to have revised his writings forty times before allowing them to be published. His works, which comprise sonnets, songs, letters, and essays, in addition to those we have mentioned, were published at Venice in four volumes in 1729. They are somewhat marred by the licentiousness which prevailed at that period. Being a priest he was unmarried, but he had three children by a mistress named Morosina.

BEMBRIDGE BEDS, a series of marls and limestones of fluviomarine origin, which occur in the Upper Eocene resting upon the OSBORNE BEDS, and succeeded by the HAMPSHIRE BEDS. These strata are well developed in the Hampshire Tertiary basin, in the northern half of the Isle of Wight, but are not represented in the London basin. They have been subdivided into (1) Upper Bembridge marl, containing the spiral univalve *Melania turritissima*; (2) Lower Bembridge marl, containing fragments of *Trionyx* (a tortoise), a large form of *Cerithium mutabile*, and *Cyrena pulchra*; (3) Bembridge Oyster Bed, a narrow but constant band marked by an abundance of oysters and marine shells of various genera; (4) Bembridge Limestone, a series of beds about 15 feet thick, and containing the fossil shells *Bulinus ellipticus*, *Helix globosa*, and *Planorbis discus*. Good building stones have been procured from this last series. Besides numerous invertebrate fossils, the remains of reptiles and mammalia occur in the Bembridge Beds, but the only plants are two species of *Chara*.

BEN is the first syllable in many Hebrew names, and means son, literally or metaphorically; for instance, *Ben-hadad* is the son or the worshipper of Hadad, or Adad, the chief idol of the Syrians. *Benjamin* is son of the right (hand), i.e. son of happiness.

BEN, BEIN, or BHEIN is a word which exists in the Scottish dialect of the Gaelic language, and has been adopted in our language to indicate the most elevated summits of the mountain ranges which traverse that part of our island which is north of the friths of Clyde and Forth. The corresponding term in some parts of Europe is *Pen* (as the Pennine Alps, the Apennines, &c.), very familiar to us in the names of several places in Cornwall and Wales.

BEN NE'VIS, a mountain of Scotland, in Inverness-shire, lies immediately to the east of Fort William, being separated from the Grampians by the desolate tract called the Moor of Rannoch. It rises 4406 feet above the level of the sea, and is thus the highest mountain in Great Britain. It is more than 800 feet higher than Snowdon, the most elevated of the Welsh mountains. Its circumference at the base exceeds 24 miles. Its outline all round is well defined. Its north front consists of two grand ascents or terraces, the level top of the lowest of which, at an elevation of about 1700 feet, contains a wild tarn or mountain lake. The outer acclivities of this, the lower part of the mountain, are very steep, though covered with a short grassy sward, intermixed with heath; but at the lake this general vegetable clothing ceases. The surface of the upper and higher part of the mountain, where not absolutely precipitous, is strewn with angular fragments of stone, of various sizes, wedged together, and forming a singularly rugged covering, among which we look in vain for any symptom of vegetable life. On the north-east side a broad, terrific, and tremendous precipice, commencing at the summit, reaches down to a depth of not less than 1500 feet. The furrows and chasms in the black beetling rocks of this precipice are constantly filled with snow. From the summit the view is remarkably grand and sublime; it commands most of the Western Islands from the Paps of Jura to Cuchullin, in Skye; and on the east the view extends to Selkellion, Cairngorm, and Ben Macdui. A station for meteorological observation has been established in recent years at the summit.

As stated in the previous article, Ben is a term used in the Gaelic to signify a high summit, and is applied to

several of the Scotch mountains, as Ben Lomond, on the east side of Loch Lomond, 3192 feet above the level of the sea, and the best known of all the Highland mountains; Ben Macdui, on the confines of Banff, Inverness, 4296 feet.

BEN, OIL OF, a fixed oil obtained from the HORSE-RADISH TREE (*Moringa pterygosperma*). This tree is a native of India and North Africa. The seed (ben-nuts) is three-cornered, about the size of a large pea, and covered with a grayish shell. The oil is expressed from the white kernels, in the proportion of 23 per cent. of the weight of the seeds. The oil is sweet, and does not readily become rancid. It separates into a solid and a liquid part. The latter is valuable to watchmakers and perfumers. L'huile antique is ben-oil impregnated with the scent of flowers.

BENAL'LA, a rising township in Victoria, Australia, on the Broken River, 122 miles N.E. of Melbourne. It is the centre of an important agricultural and pastoral district, has a savings bank, telegraph, and money-order office, and is the capital of the shire bearing the same name. It is the headquarters of the north-eastern police district. Wheat and oats are principally grown on the farms; the area of land under cultivation is large, and increasing. The district is admirably suited to the growth of grain, and of most of the fruits of the temperate zone. The vine is cultivated, and the wine has been proved to be of remarkably good quality. The district is also eminently suited for the growth of tobacco. The population of the town in 1883 was 2000; of the county, 14,000.

BENARES, a division under a commissioner in the North-western Provinces of British India, comprising the six districts of Azamgarh, Mirzapur, Benares, Ghazipur, Gorakhpur, and Basti. It lies between 23° 52' and 27° 30' N. lat., and 82° 9' and 84° 40' E. lon. The area is 18,314 square miles, and the population 8,500,000.

BENARES, a district in the above division, lying between 25° 8' and 25° 34' N. lat., and 82° 42' and 83° 35' E. lon. The area is 996 square miles, and the population 800,000. Benares district is bounded on the N. by Ghazipur and Jaunpur, on the W. and S. by Mirzapur, and on the E. by Shahabad, in Bengal. The administrative headquarters are at the city of Benares.

The district forms part of the alluvial valley deposited by the river Ganges, and occupies an irregular parallelogram on either bank of the sacred stream. The surface consists of a level plain, with a gentle upward slope on each side from the central depression; and the general monotony of its cultivated fields is only broken by the ravines of two small streamlets—the Barua in the west, and the Naud in the north—and by the deep gorges and precipitous cliffs of the Karamnasa, on the south-eastern boundary. The Ganges enters the district as a very large river, augmented at the point of leaving Allahabad by the Jumna (Jamuna), and joined, 16 miles below Benares city, by the waters of the Gunti. Before reaching the confines of Ghazipur, it presents a magnificent expanse of 4 miles in breadth during the rainy season. The Gunti also flows through the district for a course of some 22 miles, while the Karamnasa skirts the south-eastern border, a heavy stream after rains, but almost dry during the hot months, though subject, like other hill rivers, to sudden flushes, which produce considerable inundations. The only other permanent water-course is that of Barua Nadi, whose bed would run dry in the cold weather were it not prevented by a dam thrown across the slender stream about a mile above its confluence with the Ganges.

Three small marshy lakes, known as the Baripur, Koth, and Kowar *jihils*, occupy hollows in the northern plain.

The district has no forests or other waste lands of any importance, every available acre having been long brought under cultivation, and planted with a rich luxuriance of cereals or sugar-cane; while small hamlets lie thickly scattered in every direction over the face of the country.

Beasts of prey are rare, but hares, squirrels, porcupines, and monkeys abound; and wild-fowl congregate in numbers on the lakes and rivers.

The climate of Benares is one of the hottest and dampest in the North-western Provinces. No really cold weather diversifies the year, as in the upper country beyond Allahabad; and since the hot west winds have lost their force before reaching this district, *tattis*, or grass mats, fail to perform their functions of cooling the air by evaporation. The temperature more nearly resembles that of Lower Bengal than that of the north-western plains in general.

BENARES (or, more correctly, Varanasi or Banaras), the capital of the above, is the administrative headquarters of the district and division. It is the religious metropolis of the Hindu faith, and the first city of the North-western Provinces in population and importance. It lies on the left or northern bank of the river Ganges, about 120 miles below its junction with the Jumna, at an elevation of 253 feet above sea-level. It is distant from Calcutta 121 miles N.W., from Allahabad 74 miles E., and from Delhi 466 miles S.E. The Ganges forms a bay or crescent-shaped reach in front of the city, thus permitting the eye to take in at a single sweep the long line of its picturesque *ghats* and splendid temples. Though the view is everywhere obstructed within the city itself, along the bank of the Ganges is unrolled a magnificent panorama of palaces, capped by domes, minarets, and sacred buildings, in every variety of Oriental architecture. The people spend a large part of their time praying, bathing, or lounging by the waterside. The *ghats* are crowded with *fakirs* and other ash-besprinkled and almost naked ascetics, practising their devotions and life-long austerities.

Within the city the streets contain many handsome houses, substantially built, and elaborately decorated, but their narrow, dirty, and crowded state usually disappoints the visitor after the high expectations aroused by the view from the river. The upper stories often project beyond the lower floor, and small bridges thrown across the roadway occasionally connect the houses on opposite sides of the street. To prevent inspection from the neighbouring fronts, the windows have been made extremely small. The façades are often painted in fantastic patterns, to represent the mythical episodes of Hindu theology. During the fine season most of the inhabitants sleep on the roofs of their houses. The town is full of religious buildings—Hindu and Mohammedan. The temples of the ancient faith are set down at 1454, most of which are diminutive shrines; while the Mussulmans possess 272 mosques. Besides these regular places of worship, every niche, corner, and empty space upon the *ghats* and in the walls of houses is occupied by some religious image, mutilated statue, *linga*, or square-hewn sacred stone.

The chief buildings are too numerous to be fully noticed, but a few among them deserve special attention. The temple at Durga Kund, in the southern extremity of the city, has a great society of sacred monkeys attached to its precincts. It was erected by Rani Bhawani during the last century, and is remarkable for its simple and graceful architecture. The Dasasamedhi *ghat* forms one of the five sacred places of pilgrimage in Benares. Rajah Jai Singh's observatory, a handsome and substantial building, erected in 1693, overlooks the Man Mandil *ghat*. Its founder reformed the calendar for the Emperor Mohammed Shah. Close to the same spot stands the Nepalese temple, whose quaint and picturesque architecture unexpectedly betrays the influence of Chinese models. Surrounded by pure Hindu buildings, it strikes the eye at once alike by its novelty and by its graceful workmanship. A little above the observatory the burning *ghat*, where the bodies of Hindus are reduced to ashes, leads down to the river Ganges by a narrow confined pathway, with numerous slabs of stone set up on end in honour of widows who have

performed *sati*. The Well of Manibarnika, filled with the sweat of Vishnu, forms one of the chief attractions for pilgrims, thousands of whom annually bathe in its fetid waters. Stone steps lead down to the edge, crowded with worshippers, whose sins are supposed to be washed away by the efficacious spring. The graceful Tarakeswar shrine fronts the well. The huge mass of Aurangzebi's mosque, built from the remains of a Hindu temple, towers conspicuously over the brink of a steep cliff, above the Man Mandil *ghat*, with strong breastworks of masonry extending far down the bank. It is the most noticeable building in the city when seen from the river, but on a nearer view becomes chiefly remarkable for its slender minarets, 147 feet in height, and slightly inclined from the perpendicular. Bhaironath, the divine guardian and watchman of Benares, has a famous temple near the public gardens; while his sacred baton, or stone club, 4 feet in height, is deposited in a separate shrine hard by. But the Bisheshwar, or golden temple, dedicated to Siva, is the holiest among all the holy places of the sacred city. It stands close to the observatory, and contains the venerated symbol of the god, a plain singam of uncarved stone. Bisheshwar rules Benares as spiritual monarch, under whom Bhaironath acts merely as minister and magistrate. The building has a central spire, and each corner is crowned by a dome. The temple was erected by Ahalya Bai, the Marhatta Princess of Indore. The Maharajah Ranjit Singh of Lahore had the spire and domes covered with gold leaf, from which the temple derives its ordinary title. Few buildings of European origin deserve special mention. The most noteworthy is the Government College, a large structure in the Perpendicular style, faced with Chanar freestone.

The wealth of Benares depends largely upon the constant influx of opulent pilgrims from every part of India, whose presence lends the same impetus to the local trade as that given to European watering-places by the season visitors. Many of the pilgrims are rajahs or other persons of importance, who bring considerable retinues, and become large benefactors to the various shrines and temples. Hindu princes of distant states pride themselves upon keeping up a "town residence" in holy "Kasi." But besides the wealth which thus flows into the bazaars of Benares, a considerable trade is carried on by the merchants and bankers. The sugar, indigo, and saltpetre of the district find a market in the city. The trans-Gogra products of Gorakhpur and Basti, and the raw materials of Jaunpur, form large items in the through traffic of Benares. Manchester goods are imported in considerable quantities, and distributed to the neighbouring local centres. The chief manufactures comprise silk and shawls, cloth embroidered in gold and silver thread, gold filigree work, jewellery, and enameled brass vessels.

The principal institutions are the Queen's College, which has a roll of 700 students; the Normal School, missions in connection with the Church of England, the Baptist, and the London Missionary Societies, Jai Narayan's College, and the Benares Institute, a society mainly composed of native gentlemen, and devoted to literature, science, and social progress. The resident population is about 180,000.

From the earliest period of Aryan colonization in India, a city appears to have existed at the junction of the Barna with the Ganges. The name of Varanasi, converted into Banaras by transposition of the liquid consonants, frequently occurs in early Sanskrit literature. In the sixteenth century B.C., Gautama Buddha, on the eve of promulgating his new religion, fixed upon Benares as the first station for preaching the doctrine of *Nirvana*. Even before that time Benares had apparently acquired a reputation as the most sacred city of the Hindu creed; it then became, for 800 years, the headquarters of Buddhism, and about the fourth century A.D. it once more reverted to the ancient faith, whose metropolis it remains to the present day.

BENBOW, VICE-ADMIRAL JOHN, was born in 1650. His whole life, from boyhood to his death, was spent in active service at sea; but the service by which Benbow is best known in our naval history was his last. On the 11th of July, 1702, he left Port Royal in Jamaica in quest of a French squadron commanded by E. du Casse, a very brave and skilful officer. On the 19th of August Benbow came up with the French force, and though inferior in number and weight of metal, immediately attacked them. A running fight was kept up for several days; but on the morning of the 5th September his leg was broken by a chain-shot, when he ordered his cradle to be placed upon the quarter-deck, so as to command a view of the action as he lay there. The engagement lasted till it was dark, but the want of support from the other officers compelled him to sail back to Jamaica. He had the officers immediately put under arrest and tried by court-martial. They were condemned on the clearest evidence; two of the captains were shot, and the rest were visited with various degrees of punishment. Benbow survived just long enough to hear his own conduct vindicated and applauded. He died of the wound in his leg on the 4th of November, 1702.

BENCH, originally the hall or court where justice was administered, but now the name given to the elevated part occupied by the judges. It is also used to designate the judges themselves as a class, and sometimes also the bishops of the Church of England as a body, by allusion to the separate seat they occupy in the House of Lords.

BENCHERS, the governing body of the various Inns of Court, are elected to that office by the existing benchers. There is no actual limit to the number except such as convenience suggests, and the practice is to elect queen's counsel who, on receiving that appointment, choose to send in their names as candidates for the bench of their society. The fees payable at benchership vary from £26 6s. at Lincoln's Inn to £331 at Middle Temple; and in return for such payments, which go to the general fund of the Inn, the benchers have certain advantages in respect of chambers, having a life-interest in a good set at a low rental, and also a right to free and better commons in the hall.

The functions of benchers are to look after and administer the property of the Inn, to see to repairs and buildings, to maintain roadways, preserve the gardens, supply the library, maintain the chapels, and to act generally as the executive of the society which has elected them. These are their duties towards their own fraternity. Towards the public they have to discharge the duty of providing that fit and proper persons are chosen to represent suitors in the courts of justice, and of regulating within certain bounds the conduct of such persons after their admission to the profession. This duty has been recognized as devolving upon the rulers of the Inns of Court from very early times. Though the societies are voluntary, to them has been committed by custom, and also by royal warrant, the exclusive privilege of admitting persons to study and of calling them to the bar, upon such conditions in either case as they may determine.

Upon the benchers' authority over persons once admitted to membership in the society there is this important limitation—viz. that an appeal lies from their decision to the judges, as visitors of the Inns of Court, in all cases of refusal to call to the bar, or of "disbarring" or taking away the right to practice after call. The most remarkable instance of late years in which the benchers have exercised the latter authority was in the case of the notorious Dr. Kenealy, who was both disbarred and disbenchled for improper conduct in connection with the trial of the Tichborne claimant in 1874.

There can be no doubt that the public is entitled to the protection of some such authority as is exercised by benchers, when the privileges and functions of barristers are considered. Not only are barristers the exclusively privi-

leged advocates in all causes, but they are responsible for negligence and ignorance in the conduct of such causes. From their body are chosen not only the judges of the land, but many important commissioners, magistrates, revising barristers, county-court judges, and officials in the legal departments. In all these things the public are greatly interested, and have a right to be assured that none but fit persons are likely to be put forward to fill the posts. Complaints have at various times been made of the insufficient training afforded by the various Inns of Court for students, and of the absence of tests of fitness both on entry and on call to the bar. These complaints have given rise to a movement for welding the several inns or colleges into a legal university in which the benchers would be the prominent instruments of government. See **INNS OF COURT**.

BENCÖÖLEN, a Dutch settlement on the W. coast of the Island of Sumatra, in 4° 10' S. lat. and 102° 30' E. lon. In order to carry on the pepper trade with advantage, the late East India Company formed an establishment at Bencoolen in 1685, to which they afterwards gave the name of Fort Marlborough. This settlement did not at first fulfil the promise of advantage which led to its formation. In 1694 the factory was, however, described as being very prosperous; but during the next twenty-five years the English settlers were much harassed, and in 1719 they were nearly all destroyed by the natives. Bencoolen, with the other English settlements on the coast of Sumatra, was nearly destroyed by a French force under Count d'Estaing in 1760, but the town was soon rebuilt. This settlement was ultimately found to be of little commercial or political importance, and was ceded by the East India Company to the Dutch government in 1825, at which time all the other British settlements in Sumatra were also given up in exchange for the Dutch settlements on the continent of India, including the town and fortress of Malacca.

The town of Bencoolen is small, and is chiefly built on piles of bamboo, in a swampy and unhealthy district. It has, however, a fine appearance from the sea, owing to an overhanging mountain called the "Sugar-Loaf." The population of the town (13,000) is of a very mixed description, including Europeans, Dutch, English, and their descendants, Chinese, Malays, and others. Formerly the town had an extensive trade with Bengal, the Coromandel coast, and Java, but it has greatly declined. The chief exports are pepper and camphor.

BEND-EMIR, BANDEMIR, or BUNDEMEER, is the name of a river in Farsistan, or Persia proper. It rises in the hills N. of Shiraz, and flows S.E.E. towards the Lake Bakhtegan. In its course it traverses the beautiful and productive valley of Marvdasht, or Merdesht, and passes by the celebrated ruins of Persepolis, which are situated on its left bank; further on it flows through the district of Kurbal, where it is divided into numerous channels to fertilize the ground. The part of the water which is not spent in irrigation falls into Lake Bakhtegan, at a distance of about 50 miles east of Shiraz. The river received its present name in honour of an emir or governor of Farsistan, who, about the year 1000, raised an embankment [see **BAND**] for the purpose of procuring water from the river for the purpose of irrigation. It is said to have been anciently called *Araxes*.

BENDER, called by the natives Tigino, the chief town of the circle of Bender in the Russian province of Bessarabia, 35 miles from Kishineff, on the right bank of the Dniester. Up to the commencement of the present century it belonged to Turkey. It was formerly a post of high military importance, and was strongly fortified. There are several mosques, an Armenian and Greek church, and four synagogues in the town. Bender has manufactures of tobacco and candles, and a good trade is carried on in corn, wine, wool, cattle, and timber—the latter of which is floated down the Dniester. The Genoese had an establishment at

Bender as early as the twelfth century. Charles XII. of Sweden took refuge in Bender after his defeat at Pultawa in 1709. The town was often taken by the Russians, and was finally ceded to them in 1812, by the treaty of Bucharest. Its inhabitants number 24,000, and are a motley company of Russians, Turks, Armenians, Tartars, &c.

BENEDICTE, the "Song of the three holy children" (Ananias, Azarias, and Misael), which, according to the book of that name in the Apocrypha, they sang while in the midst of the fiery furnace, and which has been used as a chant in the Christian Church since the fourth century. Originally this followed the twenty-third verse of Daniel iii. in the Septuagint, though not in the Hebrew. In the Hebrew the children are always called Shadrach, Meshach, and Abed-nego. In the Church of England it is used in the order of morning prayer, when the *Te Deum* is not sung. It derives its name from the first word—*Benedicite, omnia opera Domini* ("O all ye works of the Lord, bless ye the Lord").

BENEDICT, a name assumed by no less than fourteen popes. We give notices of the more important only; what is necessary to be known of the rest will be found in the article **POPE**s.

BENEDICT III. (Pope from 855 to 858) is remarkable because under his pontificate began that long strife between Photius and Ignatius for the patriarchate of Constantinople, which eventually resulted in the separation of the Eastern ("Orthodox") from the Western ("Catholic") Church on definite dogmatic grounds. See **GREEK CHURCH**.

BENEDICT IX., nephew of the two popes, Benedict VIII. and John XIX., was elected pope in 1033 by sheer bribery, almost openly conducted, on the part of the wealthy family of Tusculum, which sought to make the papacy hereditary in this way. He was a boy at the time of his election, probably about ten years old. Benedict was distinguished by his licentiousness and profligacy, and by the state of anarchy in which Rome was plunged during his pontificate. The Romans at last expelled him in 1044, and chose in his stead John, bishop of Sabina, who took the name of Sylvester III.; but six months afterwards Benedict returned at the head of his party, drove away his competitor, and excommunicated him. Growing weary of his office, and desiring to marry his cousin, he sold his dignity to John Gratianus, who assumed the name of Gregory VI. There were therefore three popes at once—Benedict, Sylvester, and Gregory; for since his uncle refused his alliance, Benedict demanded the restitution of the papacy, in arms. Benedict held the Lateran, Gregory S. M. Maggiore, and Sylvester the Vatican. The Emperor Henry III., appealed to to put an end to these scandals, assembled a council at Sutri, which deposed all the three popes, and elected Suidger, bishop of Bamberg, who took the name of Clement II., and was consecrated at Christmas, 1046. But in October of the following year Clement fell suddenly ill and died, poisoned, as some suspected, by Benedict, who immediately forced himself again into the Papal see, where he remained till the following July, 1048; when the Emperor Henry, at the request of the Romans, sent them Poppo, bishop of Brixen, who, on arriving at Rome, was consecrated, and assumed the name of Damasus II. But twenty-three days after his consecration he died at Palestrina, upon which the see of Rome remained vacant for more than half a year, until Bruno, bishop of Toul in Lorraine, was elected in 1049, and assumed the name of Leo IX. What became of Benedict afterwards is not clearly ascertained, nor the epoch of his death, but it is generally believed that he died in the convent of Grotta Ferrata.

BENEDICT XIV. (Cardinal Prospero Lambertini, of Bologna) succeeded Clement XII. in August, 1740. He was already favourably known for his extensive learning and for the suavity of his temper and manners, and his elevation to the papacy did not destroy his good-humoured

jocularity and Bolognese wit. He exercised his ecclesiastical authority mildly, and managed his temporal concerns with great prudence and conciliation. During the war of the Austrian succession he remained strictly neutral. Peace being at length restored to southern Italy, Benedict was enabled to turn his chief attention to the improvement of his own dominions. He encouraged learning, and was generous towards the learned. Rome became again in his time the seat of science and of the arts. The mathematicians Boscovich and Le Maire, the cardinals Valenti, Querini, and Passionei, the philologist Quadrio, the architects Vanvitelli and Polani, and other distinguished men, were employed or encouraged by this pope. He embellished Rome, repaired churches, among others the splendid one of Santa Maria Maggiore, constructed magnificent fountains, that of Trevi among the rest, built the vast granaries near the Thermæ of Diocletian, and dug out the obelisk of the Campus Martius, which was afterwards raised by Pius VI., founded chairs of physics, chemistry, and mathematics in the University of Rome, added to the collection in the Capitoline Museum, established a school of drawing, enlarged the great hospital of S. Spirito, established academies for the instruction of the prelates of his court in ecclesiastical history, in the canon law, in the knowledge of the rites and discipline of the church, &c. Nor did he neglect his native town Bologna, to whose Institute of Sciences he contributed by donations. Benedict greatly strengthened the position of the papacy by wise concessions to almost every power, giving up those rights of patronage, &c., claimed in palmier days of Papal aggression, and at this time only sources of weakness and of continual quarrel. He also gained the powerful aid of the Jesuits by publishing the celebrated bull *unigenitus*, which denounced as heretical the tenets of the Jansenists; and terminated centuries of vacillation by this step—apparently politic, since it sacrificed a weak and conciliated a powerful party, but really most fatal, for it allowed that domination of the Jesuits over the church to begin which has ever since continued.

Benedict was learned not only in theology but in history, in the classical writers, and in elegant literature, and he had a taste for the fine arts. His works were published at Rome in twelve vols. 4to. He died on the 2nd May, 1758, being more than eighty years of age, and was succeeded by Clement XIII. An account of the numerous academies he founded at Rome is given in "Notizia delle Accademie erette in Roma per Ordine della Santità di N. S. Papa Benedetto XIV." (Roma, 1740.)

BENEDICT (Pedro de Luna), *Antipope*, was a native of Aragon, and was made a cardinal by Gregory XI. After the death of that pope, when the great schism broke out between Urban VI. and Clement VII., De Luna attached himself to the latter. After Clement's death in Avignon in 1394, the cardinals of his party elected De Luna as his successor, in opposition to Boniface IX., who had succeeded Urban at Rome, and he assumed the name of Benedict XIII. (The acknowledged Benedict XIII. reigned from 1724 to 1730. See **POPE**s.) France, and several other states which had acknowledged Clement, acknowledged Benedict, but the Councils of Pisa and of Constance afterwards deposed him. Benedict, who, was forced to retire to Spain, refused to relinquish his assumed dignity, and excommunicated all his antagonists. Alfonso, king of Aragon, acknowledged him, and Benedict resided at Peniscola with a few cardinals of his own appointment. At last, in 1423, Benedict died at the age of ninety. (Dupin, "Histoire du Schisme," and the histories of the Councils of Pisa and of Constance.)

BENEDICT, ST., the founder of the order of Benedictine monks, was born at Nursia, in Italy, about the year 480. He was sent to Rome when very young, and there received the first part of his education. When fourteen

years of age he removed to Subiaco, a desert place about 40 miles distant, where he was concealed in a cavern. The monks of a neighbouring monastery subsequently chose him for their abbot, but they proving unable to adopt the stringent rule demanded by Benedict, he returned to his solitude, whither many persons followed him, and put themselves under his direction; and in a short time he was enabled to found no fewer than twelve monasteries. About the year 528 he retired to Monte Casino, where idolatry was still prevalent, and where a temple to Apollo yet existed. Having converted the people of the adjacent country to the true faith, he broke the statue of Apollo, overthrew the altar, and built two oratories on the mountain, one dedicated to St. Martin, the other to St. John. Here St. Benedict also founded a monastery, and instituted the order of his name, which in time became so famous that it extended all over Europe. It was here, too, that he composed his "*Regula Monachorum*." He died about 643. He was at once canonized, and Gregory (St. Gregory) wrote an account of his life and miracles. His sister, St. Scholastica, was equally devout, and as far as her lifetime went, founded almost as many communities. Brother and sister were warmly attached, yet they considered it a merit to meet but once a year.

BENEDICTINE ORDER. The exact year when the monks who followed the rule of St. Benedict were first established as an order is unknown, but it was about the year 528, and the founder was St. Benedict himself. [See BENEDICT, Sr.] The progress which this order made in the west, in a short time, was rapid. The reciprocal protection afforded to the interests of the Papal see by the Benedictine order, and to the interests of the Benedictine order by the Roman pontiffs, sufficiently account for the order's advancement. There were nuns of this order as well as monks. Few great towns were without one of their convents.

The Benedictine order was brought into England by St. Augustine and his brethren, A.D. 596, and continued from this time to the dissolution under several improvements. The dress was black, and the order often went by the popular name of the "Black Monks." All our cathedral priories were of this order, except Carlisle, and also most of the richest abbeys in England. Tanner ("*Notit. Monast.*") enumerates 113 abbeyes, priories, and cells of this order in England, the sum of whose revenues, at the time of the dissolution, amounted to £57,892 1s. 11d., besides seventy-three houses of Benedictine nuns, whose revenues amounted to £7985 12s. 1d., making a total of £65,877 14s. In Scotland, Melrose, Arbroath, Dunfermline, and many other of the greatest abbeys belonged to this order. It was always a great home of learning, and has been of invaluable service to literature and art, in preserving and creating masterpieces which would otherwise have perished or never have existed. It produced many great statesmen, too, as Anselm and Lanfranc (archbishops of Canterbury). At the Reformation upwards of 15,000 Benedictine monasteries were known.

BENEDICTION, the act of invoking the favour of God upon individuals. The ceremony of blessing is of a very remote antiquity. We find in the Scriptures that the patriarchs, before they died, solemnly bestowed their blessing on their sons. Aaron blessed the people, "lifting his hand towards them" (Lev. ix. 22). Christ after his resurrection, and before parting from his disciples at Bethany, "lifted up his hands, and blessed them" (Luke xxiv. 50). In the early church the bishop gave his blessing to the people with his hands extended towards them. In the Roman Catholic Church it is the custom for the bishop to lift up his right hand towards the people with the thumb and two first fingers extended, and with it to describe the sign of the cross, in commemoration of the Redemption.

The benediction forms an essential part of many ceremonies.

monies of the Roman Catholic Church, such as the coronation of kings and queens, the confirmation of abbots and abbesses, the consecration of churches, altars, and sacramental vases. The nuptial benediction, which is an essential part of the marriage ceremony, is given by the parish clergyman. The "*benedictio mensæ et ciborum*," was a general practice among all Christians before sitting down to dinner; the English custom of saying grace is a continuation of it.

BENEDICTUS, the Song of Zacharias, which is used as a canticle in the morning service of the Church of England. The fine musical settings of the great Elizabethan composers, Tallis and Gibbons, are well known.

With musicians, however, the word generally describes one of the musical portions of the Roman Catholic Mass occurring immediately after the Sanctus, and consisting merely of the phrase—*Benedictus qui venit in nomine Domini* ("Blessed is he that cometh in the name of the Lord"). It is with the great masters the movement of melody and expression, forming a tender contrast to the jubilant strains of the Sanctus, which precedes it.

BENEFICE (from the Latin *beneficium*), a term applied both by the canon law and the law of England to a provision for an ecclesiastical person. In its most comprehensive sense it includes the temporalities as well of archbishops, bishops, deans and chapters, abbots and priors, as of parsons, vicars, monks, and other inferior spiritual persons. But a distinction is made between benefices attached to communities under the monastic rule (*sub regula*), which are called *regular* benefices, and those the possessors of which live in the world (*in sæculo*), which are thence called *secular* benefices. The writers on the canon law distinguish, moreover, between *simple* or *secure* benefices, which do not require residence, and to which no spiritual duty is attached except that of reading prayers and singing (as chaplains, canons, and chantries), and *sacredotal* benefices, which are attended with cure of souls.

In modern English law treatises the term is generally confined to the temporalities of parsons, vicars, and perpetual curates, which in popular language are called livings. The legal possessor of a benefice attended with cure of souls is called the incumbent. The history of the origin of benefices is involved in great obscurity. The property of the Christian Church appears, for some centuries after the apostolic ages, to have been strictly enjoyed in common. It was the duty of the officers called deacons (whose appointment is mentioned in Acts vi.) to receive the rents of the real estates, or *patrimonia*, as they were called, of every church. Of these, as well as of the voluntary gifts in the shape of alms and oblations, a sufficient portion was set apart, under the superintendence of the bishop, for the maintenance of the bishop and clergy of the diocese; another portion was appropriated to the expenses of public worship (in which were included the charges for the repairs of the church), and the remainder was bestowed upon the poor. This division was expressly inculcated by a canon of Gelasius, bishop of Rome, A.D. 470. After the payment of tithes had become universal in the west of Europe, as a means of support to the clergy, it was enacted by one of the capitularies of Charlemagne that they should be distributed according to this division. When the bishoprics began to be endowed with lands, the bishops, to encourage the foundation of churches, and to establish a provision for the resident clergy, gave up their portion of the tithes, and were afterwards, by the canons, forbidden to demand it, if they could live without it. Although the revenues of the church were thus divided, the fund from which they were derived remained for a long time entirely under the same administration as before. But by degrees every minister, instead of carrying the offerings made in his own church to the bishop, for the purpose of division, began to retain them for his own use. The lands also were

apportioned in severalty among the resident clergy of each diocese. These changes were not all made at one time.

It seems probable that, after the feudal system was firmly established in the west of Europe, during the ninth and tenth centuries, its principles were applied to ecclesiastical as well as lay property. Hence, as the estates distributed in fief by the kings of France and Germany among their favoured nobles were originally termed *beneficia*, this name was conferred upon the temporal possessions of the church. Thus the bishoprics were supposed to be held by the bounty of the kings (who had by degrees usurped the right, originally vested in the clergy and the people, of filling them up when vacant), while the temporalities of the inferior ecclesiastical offices were held of the bishops, in whose patronage and disposal they for the most part then were. The manner of investiture of benefices in those early times was probably the same as that of lay property, by the delivery of actual possession, or of some symbols of possession, as the ring and crozier, which were the symbols of investiture appropriated to bishoprics.

In England several causes contributed to the rise of parochial churches. "Sometimes," says Dr. Burn ("Eccles. Law," title "Appropriation"), "the itinerant preachers found encouragement to settle amongst a liberal people, and by their assistance to raise up a church and a little adjoining manse. Sometimes the kings, in their country villas and seats of pleasure or retirement, ordered a place of worship for their court and retinue, which was the original of royal free chapels. Very often the bishops, commiserating the ignorance of the country people, took care for building churches, as the only way of planting or keeping up Christianity among them. But the more ordinary method of augmenting the number of churches depended on the piety of the greater lords, who, having large fees and territories in the country, founded churches for the service of their families and tenants within their dominion. It was this that gave a primary title to the patronage of laymen; it was this made the bounds of a parish commensurate to those of a manor; and it was this distinct property of lords and tenants that, by degrees, allotted new parochial bounds, by the adding of new auxiliary churches." See ADVOWSON.

The regular payment of tithes to the ministers of the respective parishes in which each man dwelt was established by Pope Innocent III. by a decretal epistle to the Archbishop of Canterbury; for up to this time the payment is said to have been made to such church as the giver chose to attend. This injunction, though not having the force of a law, has been complied with ever since, so that it is now a universal rule of law in England that tithes are due to the parson of the parish, unless there be a special exemption. See TITHES.

Till the twelfth century the simple donation of the patron was sufficient to confer a legal title to a benefice, provided the person to whom it was given was in holy orders, for otherwise he must be first presented to the bishop, who had power to reject him in case of unfitness; but the popes, who had in the eleventh and twelfth centuries successfully contended against every other species of ecclesiastical investiture being exercised by laymen, now procured that the presentation of the patron should not be of itself sufficient to confer an ecclesiastical benefice, even though qualified by the discretionary power of rejection (in case the benefice was given to a layman) which was already vested in the bishop. This was the origin of the ceremonies of *institution*, which is the mode of investiture of the spiritualities; and *induction*, which is the mode of investiture of the temporalities of a benefice. Where the bishop was the patron of the benefice, the two forms of *presentation* and *institution* were united in that of *collation*. These terms are still in use.

The first attacks by the popes upon the rights of private

patrons (which took place towards the latter end of the twelfth century) assumed the form of letters of request called "mandates" or "expectives," praying that benefices might be conferred on particular individuals. Clement V., in the beginning of the fourteenth century, went beyond all his predecessors, by declaring that the disposition of all ecclesiastical benefices belonged to the pope ("Clementines," lib. ii. tit. 5, c. 1; F. Paul, c. 35). The pope accordingly made reversionary grants, or *provisions*, as they were called, during the lives of the incumbents; and he reserved such benefices as he thought fit for his own peculiar patronage. At the same time, dispensations from the canons against non-residence and pluralities, and permissions to hold benefices *in commendam* were freely granted, so that by these and similar means in some instances fifty or sixty preferments were held by the same person at once. The evils of this system were felt all over Europe. England in particular suffered greatly from these Papal encroachments during the reign of Henry III. The parliament assembled at Carlisle in the thirty-fifth year of Edward I. wrote a strong remonstrance to Pope Clement V. against the Papal encroachments on the rights of patronage, and the numerous extortions of the court of Rome. This remonstrance appears to have produced no effect. The first prince who was bold enough to assert the power of the legislature to restrain the Papal encroachments was Edward III. After complaining ineffectually to Clement VI. of the abuse of Papal reservations, he (A.D. 1350) procured the famous Statute of Provisors (25 Edw. III. s. 6) to be passed. This act provided that all elections and collations should be free according to law; and that in case any provision, collation, or reservation should be made by the court of Rome of any archbishopric, bishopric, dignity, or other benefice, the king should for that turn have the collation of such archbishopric or other dignities elective, &c.

This statute was fortified by several others in this and the succeeding reigns, down to the 3 Hen. V. c. 4. These statutes, which inflict very severe penalties on persons endeavouring to enforce the authority of Papal bulls and provisions in England, are sometimes called, from the initial words of the writ issued in execution of the process under them, the statutes of *premunire*; and the offence of maintaining the Papal power is itself called a *premunire*. The statutes against Papal provisions (though not very strictly enforced) remained un repealed.

The law as to ecclesiastical patronage which was thus maintained by the English legislature, continues in the main unaltered to the present time. Every clerk before institution or collation is required to take the oath against simony, and the oath of the canonical obedience to the bishop, and to declare by subscription his assent to the doctrine of the king's supremacy, to the Book of Common Prayer, and the Thirty-nine Articles. The subscription to the Thirty-nine Articles was imposed by statute 18 Eliz. c. 12, upon all persons to be admitted to any benefice with cure of souls. By statute 18 & 14 Car. II. c. 4 (commonly called the Act of Uniformity), every parson and vicar was required, before his admission to be incumbent, to subscribe a declaration of his unfeigned "assent and consent" to the Liturgy of the Church of England, as by law established. In 1866, however, an Act was passed to "alter and simplify" the law on clerical subscriptions, and the declaration is now as follows:—"I assent to the Thirty-nine Articles of Religion and the Book of Common Prayer, and of the ordering of bishops, priests, and deacons; I believe the doctrines of the Church of England, as therein set forth, to be agreeable to the Word of God; and in public prayer and administration of the sacraments I will use the form in the said book presented and none other, except as shall be ordered by lawful authority."

The acts of institution or collation so far confer a right

to the temporalities of the benefice that the clerk may enter upon the glebe land and take the tithes, but he cannot sue for them or grant them until induction. By induction he is seized of the temporalities of the benefice, and invested with the full rights and privileges of a parson, *persona ecclesiæ*; but he must, within two months after he is in actual possession of his benefice, upon some Sunday, openly before his congregation, read the morning and evening prayers, and declare his assent to the Book of Common Prayer, on pain, in case of neglect or refusal, of being *ipso facto* deprived of his benefice.

Non-residence is now regulated by 1 & 2 Vict. c. 106. Under this act the penalties for non-residence of an incumbent without a license from the bishop of the diocese are— one-third of the annual value of the benefice when the period of absence exceeds three and does not exceed six months; one-half of the annual value when the absence exceeds six and does not exceed eight months; and when the period of non-residence has been for the whole year three-fourths of the annual income are forfeited. Certain persons are exempt from the penalties of non-residence, as the heads of colleges at Oxford and Cambridge, the warden of Durham University, and the head-masters of Eton, Winchester, and Westminster schools. Privileges for temporary non-residence are granted to a great number of persons who hold offices in cathedrals, and at the two universities of Oxford and Cambridge, and so forth.

There are certain liabilities which parsons, vicars, and other spiritual persons legally incur in respect of their benefices. Thus, by 43 Eliz. c. 2, they are ratable in respect of their benefices for the relief of the poor; and, although the burden of the repairs of the body of the church falls upon the parishioners, the rector (and, where the parsonage is appropriated, the impropriator) is liable for the repairs of the chancel.

All ecclesiastical incumbents are liable for dilapidations. A dilapidation is said to be the pulling down or destroying in any manner any of the houses or buildings belonging to a spiritual living, or suffering them to run into ruin or decay, or wasting or destroying the woods of the church, or committing or suffering any wilful waste in or upon the inheritance of the church. Such proceedings may be prevented by the spiritual censures of the ordinary, and the profits of the benefice may be sequestered until the damage be repaired; and the Court of Chancery will, at the suit of the patron, grant an injunction to restrain this as well as every other species of waste. Or the next incumbent may recover damages for dilapidations. The Ecclesiastical Dilapidations Act, passed in 1871, provides for the loan of money for repairs from Queen Anne's Bounty; and renders it compulsory for the incumbent to insure all buildings on his benefice, and the church chancel.

With respect to actions and suits for recovery of lands or rents by parsons, vicars, or other spiritual corporations sole, the 3 & 4 Will. IV. c. 27, s. 29, subjects them to the period of limitation of two successive incumbencies, together with six years after the appointment of a third person to the benefice, or in case of this period not amounting to sixty years, then to the full period of limitation of sixty years.

Benefices may be vacated or avoided:

1. By the death of the incumbent.

2. By resignation, in case of age or infirmities rendering the holder of a benefice unable longer to discharge the duties. The Incumbents' Resignation Act, passed in 1871, provides for such resignations, and for a pension to the resigning incumbent out of the funds of his benefice, not exceeding one-third of its net annual value. When two parsons wish to resign in order to exchange benefices, they must obtain a license from the ordinary to that effect.

3. A benefice may be avoided by the incumbent's being promoted to a bishopric; but avoidance in this case does

not take place till the consecration of the prelate. The patronage of the benefice so vacant belongs for that turn to the king.

4. If an incumbent of a benefice with cure of souls accepted a second benefice of a like nature without procuring a dispensation, the first, by the provisions of the canon law, was so far void that the patron might present another clerk, or the bishop might deprive; but till deprivation no advantage could be taken by lapse. The statute 21 Henry VIII. c. 13, relating to pluralities, was repealed by 1 & 2 Vict. c. 106, which was again amended by the 13 & 14 Vict. c. 98, and it is now provided that two benefices cannot be held by one person, unless they be within 3 miles of each other, and the value of one does not exceed £100 a year.

5. Another mode of avoidance of a benefice is by deprivation under a sentence of an ecclesiastical court. The principal causes on which sentence of deprivation is usually founded are heresy, blasphemy, gross immorality, or conviction of treason, murder, or felony.

6. A benefice may be avoided by act of the law; as where the incumbent omits or refuses to assent to the Thirty-nine Articles, or to read the Articles or Book of Common Prayer, in pursuance of the statutes which render those acts necessary. By the 31 Eliz. c. 6, for the avoiding of simony, it is among other things enacted that if any patron, for any sum of money, reward, profit, or benefit, or for any promise, agreement, grant, bond, or for any sum of money, reward, gift, profit, or benefit, shall present or collate any person to an ecclesiastical benefice with cure of souls or dignity, such presentation or collation shall be utterly void, and the crown shall present to the benefice for that turn only. The statute also imposes a penalty upon the parties to the simoniacal contract to the amount of double the value of a year's profit of the benefice, and for ever disables the person corruptly procuring or accepting the benefice from enjoying the same. And by statute 12 Anne, c. 12, s. 2, a purchase by a clergyman, either in his own name or that of another, of the next presentation *for himself*, is declared to be simony, and is attended with the same penalties and forfeiture as are imposed by the statute of Elizabeth. The circumstance of the incumbent being at the point of death at the time of the contract may also vitiate the transaction, except where the fee-simple of the advowson is purchased, in which case it has been decided that the knowledge of the state of the incumbent's health does not make the purchase simoniacal.

The Church of Ireland having been formerly united with that of England, the ecclesiastical polity of each was, in its main features, the same; but most of this was altered by the celebrated Act, passed in 1869, for the disestablishment and disendowment of the Irish Church [see IRELAND], under which there is now nothing in Ireland exactly corresponding, in the eye of the law, to a benefice in England.

Particulars respecting benefices in the Church of Scotland will be found under the articles ESTABLISHED CHURCH, and SCOTLAND.

BENEFICIA RII, a name given to the Roman soldiers on whom were bestowed the conquered lands on the frontiers of the empire, which were distributed among them as rewards for their services. These lands were called *beneficia*, as being held on the pure beneficence of the sovereign. Though at first only given for life, they afterwards by degrees became hereditary and patrimonial. In the middle ages these kinds of tenure were adopted both in France and England; and hence, doubtless, the term *beneficia* became applied to church livings, as arising from the beneficence of princes or nobles.

BENEFIT OF CLERGY. This privilege had its origin in the endeavours of the popes to withdraw the clergy from secular jurisdiction. In England these attempts, being resisted by the earlier kings after the

Conquest, only succeeded in procuring—1, the exemption of places consecrated to religious purposes from arrest for crimes, which was the origin of sanctuaries; and 2, the exemption of clergymen in certain cases, principally of felony, from criminal punishment by secular judges. When an accused person pleaded his "clergy," the ordinary (a clerical official who attended every *gaol* delivery) appeared and demanded him; a jury was then summoned to inquire into the truth of the charge, and according to their verdict the accused was delivered to the ordinary either as *acquitted* or *convicted*, to undergo canonical purgation, and then to be discharged or punished according to the result of the purgation. This privilege never extended to high treason. In earlier periods of our history the benefit of clergy was not allowed unless the prisoner appeared in his clerical habit and tonsure to claim it; but in process of time, as the original object of the privilege was lost sight of, the only proof required of the offender's clergy—that is, his claim to the benefit or privilege—was his showing to the satisfaction of the court that he could read. This practice continued until a comparatively late period, but by the 5th of Anne the reading was abandoned as unnecessary.

The statute 4 Henry VII. c. 13 (1488), revived the distinction between clergymen and such persons as merely possessed a competent skill in reading, by providing that no person once admitted to the benefit of clergy should a second time be allowed the same privilege unless he produced his orders; and, to mark those who had once claimed the privilege, the statute enacted that all persons not in orders, to whom it was so allowed, should be marked upon the "brawn of the left thumb" in the court, before the judge, before such person was delivered to the ordinary. During the seventeenth century the burning was commuted. As benefit of clergy was shamefully abused, the statute 18 Eliz. c. 7, enacted that, in all cases after an offender had been allowed his clergy, he should be discharged by the court, with a provision that he might be detained in prison for any time not exceeding a year, at the discretion of the judge before whom he was tried.

The continuance of this antiquated clerical privilege having become extremely detrimental to justice, it was enacted by 7 & 8 Geo. IV. c. 28, that benefit of clergy with respect to persons convicted of felony shall be abolished. Since the passing of this statute the subject is of only historical interest.

BENEKE, FRIEDRICH EDUARD, a German philosopher, was born at Berlin 17th February, 1798. He entered the University of Halle in 1816 as a student of theology, but returned the next year to Berlin, where he became a pupil of Schleiermacher, and devoted himself to the study of philosophy. In 1820 he established himself as a private-docent at the University of Berlin, and commenced a course of lectures; but in 1822 he was compelled by the minister Altenstein to relinquish his post, as he had proved himself to be a formidable rival to Hegel, who at that time enjoyed the favour of the court. In 1824 he removed to Göttingen, where he remained until 1827, when he returned to Berlin, and was allowed to reopen his class. In 1832, after the death of Hegel, he was appointed a professor of philosophy at the university there, which he retained until his death. On the 1st March, 1854, suffering from a fit of nervous depression, he suddenly disappeared from his home, and his body was found afterwards in one of the canals near the city.

His philosophy, like that of Locke, rests upon the analysis of ideas as presented by the phenomena of man's inward experience. Taking his start from a few simple physiological facts he builds up an entire system, in which the whole machinery of our impulses, feelings, desires, perceptions, and ideas are ingeniously analyzed and accounted for. Like all enthusiastic systematizers, however, he is too one-sided to represent the whole truth of the case. He was

the author of numerous works, among the most important of which are the "Lehrbuch der Psychologie als Naturwissenschaft" (1833), "System der Logik" (two vols., 1842), "Erziehungs- und Unterrichtslehre" (1842), and "Pragmatische Psychologie" (two vols., 1850).

BENEVENTO, the capital of a province of the same name in South Italy, is situated on a hill at the junction of two valleys, between the rivers Calore and Sabato, which meet below the town, and flowing westward throw their united waters into the Volturno. Benevento is 30 miles N.E. of Naples, and 125 E.S.E. of Rome. It belonged in ancient times to the Samnites, and was then called *Maleruntum*. The Romans, having subdued the Samnites and taken the town in 274 B.C., sent a colony there, and changed its name to *Beneventum*. The Appian Road passed through it. In the sixth century after the fall of the Western Empire, Benevento was taken by the Longobards, who established a dukedom, which included all their conquests in Samnium, Campania, and Apulia. The dukes of Benevento, owing to their vast possessions and their remoteness from the Longobard capital, Pavia, were for a long time independent. The Normans took the country and gave it up to the pope, who, however, allowed the old princes to remain as feudatories of the Roman see until 1077, when Landolphus, the last of the race, died, leaving no heirs. From that time, with some slight intervals, it remained under the direct dominion of the popes for several hundred years, and was governed by a resident cardinal with the title of legate. Four councils were held in the city in the eleventh and twelfth centuries. In 1806 Napoleon, having conquered Naples, gave Benevento to Talleyrand with the title of Prince, but it was restored to the pope in 1815, and remained faithful to him in the revolution of 1848-49. In 1861, however, it was annexed to the kingdom of Italy.

The town is surrounded by walls, and has an old castle at its eastern extremity; the streets are narrow and steep. The ancient cathedral is the principal building, and is a beautiful edifice in the Lombard-Saracenic style. Adjoining the cathedral is the archiepiscopal palace. There are several other churches, a seminary, and a town-house, which is a fine structure. The town has a good trade in corn, and some manufactures of gold and silver ware and parchment. The population amounts to 22,000. The number of Roman antiquities is very great and almost every house is built out of the remains of Roman altars, monuments, columns, beams, &c. But the most interesting monument of antiquity is Trajan's triumphal arch, which is one of the finest in existence. It forms one of the city gates on the road to Puglia, and is called the *Porta Aurea*. It consists of a single arch of Parian marble of the Corinthian order, highly ornamented with basso and alto reliefs—representing various events in the reign of the emperor. The territory is hilly, but fertile in corn, fruit, and pastures.

BENEVOLENCE, one of the arbitrary modes of obtaining money which, in violation of Magna Charta, were formerly resorted to by the kings of England. The name implies a free contribution, with or without the condition of repayment. The extravagance of Edward IV. led him to levy benevolences very frequently. One of the best acts of his successor, Richard III., was to procure the passing of a statute (c. 2) in the only parliament assembled during his reign, by which benevolences were declared to be illegal. Henry VII. exacted benevolences in a very oppressive way. Cardinal Wolsey proposed to raise money for Henry VIII. by a benevolence, which the citizens of London objected to, alleging the statute of Richard III. Elizabeth also "sent out her privy seals," for so the circulars demanding a benevolence were termed; but, though individuals were committed to prison for refusing to contribute, she repaid the sums which were exacted.

Charles I. appointed commissioners for the collection of

a general loan, and they had instructions to require not less than a certain proportion of each man's property in land or goods, and had extraordinary powers given them. Many of the common people were impressed to serve in the navy for refusing to pay, and a number of the gentry were imprisoned. The detention of five knights, who sued the Court of King's Bench for their writ of Habeas Corpus, gave rise to a question respecting the freedom of Englishmen from arbitrary arrest, and out of the discussion which then arose, and the contests respecting the levying of ship-money, &c., came the assertion and establishment of the great principle of English liberty, "Petition of Right." The Bill of Rights, in 1688, repeats what Magna Charta declared in 1215, that levying money for or to the use of the crown, by pretence of prerogative, without grant of Parliament, for longer time or in any other manner than the same is or shall be granted, is illegal.

BENGAL, the largest and most populous of the three great political sections of British India called Presidencies. It forms a lieutenant-governorship, and includes the four great provinces of Lower Bengal (or Bengal proper), Behar, Orissa, and Chota Nagpore, with a united area of 156,081 square miles, and a population of 66,530,127. The four provinces are comprised within 19° 28' and 27° 30' N. lat., and 81° 35' and 92° 46' E. lon., and are bounded on the N. by the independent native states of Nepal, Sikkim, and Bhutan; on the E. by the province of Assam, the hill country of the Lushai and Kuki tribes, and the Aracan Hills of British Burmah; on the S. by the Bay of Bengal; and on the W. by Madras and the central and north-western provinces.

Broadly speaking, the chief characteristic of the extensive provinces of Bengal are the plain of the Lower Ganges sloping from the N.W.; the plain of the Lower Brahmaputra from the foot of the Garo Hills, sloping due S.; and the great delta of Bengal. On the S.W. of these great plains rise the highlands of Chota Nagpore and Orissa; on the E. are the Chittagong, Tipperah, Garo, Khasi, and other hills; on the N. is the hilly Darjeeling district and the Bengal Himalayas.

Bengal proper, often referred to as Lower Bengal, is the great alluvial and deltaic plain between the Himalayas and the Bay of Bengal.

Behar is the Gangetic plain lying between Bengal proper and the north-western provinces. In Behar is also included a narrow range of hills in the Southal Parganas, known as the Rajmahal.

Chota Nagpore is the elevated and hilly country W. of Bengal proper, S. of Behar, and N. of Orissa.

Orissa comprises a long flat deluvial strip between the hills and the sea (forming one settled province) and a large hilly tract beyond occupied by tributary states.

Physical Features.—The greater part of Bengal proper and Behar are uninterrupted flats subject to inundation, rich in black mould, and most fertile, the Dacca division being so fertile that it has been called the granary of Bengal. The whole presidency may be regarded as consisting chiefly of two broad river valleys. By the western one the Ganges brings down the wealth and accumulated waters of Northern India. The eastern valley forms the route by which the Brahmaputra, after draining the Tibetan plateau far to the N. of the Himalayas, and skirting round their passes not far from the Yang-tse-kiang and the great river of Cambodia, ends its tortuous journey of 1800 miles. These valleys, although for the most part luxuriant alluvial plains, are diversified by spurs and peaks thrown out from the great mountain systems which wall them in on the N.E. and S.W. In them is grown, in almost inexhaustible profusion, every vegetable product which feeds and clothes a people, and enables it to trade with foreign nations. Nor is the country destitute of mineral wealth, for amid the hilly spurs and undulations on either side, coal, and iron

and copper ores hold out a new future to Bengal as capital increases, and ready facilities of communication are provided.

The salient physical feature of Bengal is its rivers. These untaxed highways bring down, almost by the motive power of their own currents, the crops of Northern India to the sea-board—an annual harvest of wealth to the trading classes. Lower Bengal, indeed, exhibits the two typical stages in the life of a great river. In the northern districts the rivers run along the valleys, receive the drainage from the country on either side, absorb broad tributaries, and rush forward with an ever-increasing volume. But near the centre of the provinces they enter upon a new stage in their career. Their main channels bifurcate, and each new stream so created throws off its own set of distributaries to right and left. The country which they thus inclose and intersect forms the delta of Bengal. Originally conquered by fluvial deposits from the sea it now stretches out as a vast dead level, in which the rivers find their velocity checked. Their diminished currents cease to carry along the silt which they have brought down from Northern India. The streams accordingly deposit their alluvial burden in their channels and upon their banks, so that by degrees their beds rise above the level of the surrounding country. In this way the rivers in the delta slowly build themselves up into canals, which every autumn break through or overflow their margins, and leave their silt upon the adjacent flats. Thousands of square miles in Lower Bengal thus receive each year a top-dressing of virgin soil, brought free of expense from the Himalayas—a system of natural manuring which defies the utmost power of over-cropping to exhaust its fertility, and renders Lower Bengal the richest and most productive portion of the whole presidency. As the rivers creep further down the delta they become more and more sluggish, and their bifurcations and interlacings more complicated. The last scene of all is a vast amphibious wilderness of swamp and forest, amid whose solitudes their network of channels insensibly merges into the sea. Here the perennial struggle between earth and ocean goes on, and all the ancient secrets of land-making stand disclosed. The rivers, finally checked by the dead weight of the sea, deposit their remaining silt, which emerges as banks or blunted promontories, or after some years of battling with the sea adds a few feet, or it may be a few inches, to the foreshore.

Mountains.—In the small part of the Himalaya chain coming within the Bengal jurisdiction there are elevations varying from 7000 feet above the sea at Darjeeling on the S. to lofty Kanchenjunga, 28,000 feet, on the N.W. The Rajmahal Hills in the Southal Parganas, ending with the town of that name on the Ganges, form the eastern projection of the central Indian formation running through the Chota Nagpore province, which is hilly throughout, but with few elevations beyond about 4000 feet. A continuation of the same central Indian formation runs through the tributary states of Orissa, with varying height of from 2000 to 4000 feet. On the east the mountainous tracts of Hill Tipperah and Chittagong are a continuation of the Manipur and Lushai ranges, with elevations rising to 11,000 and 12,000 feet.

Rivers, Climate, &c.—The Ganges river touches the Behar province at Buxar on the East India Railway, and enters it near Chupra, where the Gogra from the N. meets it. It then receives the Soane on the S., and the Gandak and Kosi again on the N., all rivers of considerable volume. Turning the corner of the Rajmahal Hills the Ganges flows with its greatest body of water in a S.E. direction, where the Bhagirati first flows away from it on the W. side to form the Hoogly, the most navigable of its many mouths. The main stream, continuing its course and throwing off several channels to form the delta, meets the main stream of the Brahmaputra (known here as the Jamuna) at Goalundo, the terminus of the Eastern Bengal Railway; the amalgamated column then empties itself by numerous

channels into the Bay of Bengal. From these rivers the Gangetic delta is formed. Between the cultivated portions of this delta and the sea is a tract bearing the general name of the Sundarbans, covered with dense forest, and which, owing to the inroads of the sea and wild beasts, as well as its general unhealthiness, has baffled the enterprise of modern man. The area of this tract is about 5340 square miles.

Besides the two great rivers there are numerous minor streams, chiefly affluents of the Ganges, such as the Cusi, Conki, Damuda, Rupnarian, Ghagra, Gandak, Teesta, Manas, Soane, and Mahanadi or Great River of Orissa. In addition to rivers there is a large number of small water-courses or natural canals which intersect Bengal in every direction, communicating from one river to another. On account of the loose materials of which the soil is composed, and which easily yield to the friction of the stream, the rivers are constantly changing their courses, the new channels being so much land lost, while the old beds constitute accessions to the adjacent estates. Thus one man's property is diminished, while that of another is enlarged or improved; and a distinct branch of jurisprudence has grown up, the particular province of which is the definition and regulation of the alluvial rights alike of private property and of the state.

There are a great number of extensive *jeels* (shallow lakes) in Bengal. The greater part of these contain little or no water during the dry season, but are so swollen by the rains as to offer facilities for the conveyance of produce in boats of large dimensions. Some of these jeels are navigable throughout the year. It is supposed that these stagnant sheets of water were originally parts of the channels of great rivers, the courses of which have been changed by the means just described.

The instability of the soil which admits of these changes is one reason why the buildings throughout the province are usually of a frail description. The habitations of the poorer classes are made of such slight materials that few of them will last beyond the second or third year, while the dwellings of the wealthy are of a very homely description. Few persons care to expend much money in the erection of a building which by an ordinary casualty may be damaged or destroyed in a few seasons.

There is considerable regularity in the changes of the seasons in Bengal. The four months from February to May are dry, and become gradually hotter. May being an intensely hot month. In June and July the rains are very violent. August is less rainy. September is intensely hot. A dry and cooler season then ensues. The rivers begin to swell near their sources before the rain sets in, owing to the melting of the snows on the mountains of Tibet. At first the rising proceeds at the rate of about an inch daily; at the end of about two weeks the rate of increase is accelerated, and before the setting in of the rains amounts to nearly 3 inches in the day. During the rains the daily rise is as much as 5 inches. At this time all the lower parts of Bengal contiguous to the courses of the Ganges and Brahmaputra, are covered with water by the rains before the rivers are sufficiently swollen to overflow their banks. But after this has occurred the country presents one uniform surface of water for an extent of more than 100 miles. In order to prevent the mischief that might ensue from the rushing of so great a body of water from the overcharged rivers caused by these floods, dikes and artificial banks are constructed in various situations, which are kept up at a great expense.

The boats used for passing on the rivers are of considerable size, and in shape like pleasure-barges; they draw 4 to 5 feet water, and are called *badgerows*. In the dry season their course down the stream does not exceed 40 miles in twelve hours; at other times from 50 to 70 miles are passed in that time. The current is strongest during

August and September, when the water is subsiding. In ascending the streams the boats are tracked by oxen.

Natural Productions.—The produce of the soil in this province includes almost every kind of grain and pulse cultivated in Europe, with other objects proper to the climate of the country. Rice is the most generally and extensively grown of all these objects, and is found in almost every part of the province in an endless variety of species. In the management of the land for this, the most important object of cultivation, embankments are formed for retaining the water on the plains, and for preserving it in reservoirs on the higher grounds, whence it is conveyed, as occasion requires, for the purpose of irrigating the lands below. Many tanks have been built for the same purpose. So successful is the rice cultivation that not only is sufficient produced to provide the main staple of food for more than 60,000,000 people, but about 300,000 tons, of the value of nearly £2,000,000, are annually exported.

Next to rice jute forms the principal product of the country, the best varieties being grown in Eastern Bengal. It is exported to the value of more than £4,000,000 annually. Indigo is largely cultivated in the districts of Nudden, Jessore, Purneah, and over the whole of central Bengal. The cultivation of opium is a government monopoly, and is principally carried on in Behar. The other commercial staples are hemp, oil-seeds, ginger, turmeric, cotton, cocoa-nuts, date-sugar, tobacco, sugar-cane, betel-nut, betel-leaf, tea, silk, lac, lac-dye, safflower, saltpetre, cinchona, and ipecacuanha.

The cattle employed in husbandry labour are of small size, and their value is seldom greater than five or six rupees (ten or twelve shillings) per head. The religious restrictions of the Hindus prevent all care for the improvement of cattle. Buffaloes are kept for the sake of their milk, the expense attending them being less than that of keeping cows. Sheep are far from being numerous; they are of very diminutive size, but when well fed their flesh is excellent. Their wool is used for making coarse blankets for the native population. The horses of Bengal are of a very inferior breed, ill-shaped, and but ill adapted for labour of any kind. Elephants and camels, which are much used among the wealthier inhabitants, are kept in good condition, and are very serviceable on journeys, and for the conveyance of goods. Dogs are very abundant in the towns, as are jackals, apes, and monkeys in the woods and jungles; numerous species of the deer are met with in every district, and in some lions and tigers are prevalent. The herons are so numerous as to serve the part of scavengers in the chief towns.

Fish is exceedingly abundant, and within the reach of almost every class of inhabitants, particularly at certain seasons, when the poorer among the natives are said to contract diseases from eating too plentifully of this description of food. Among the most highly esteemed kinds of fish are the bicktee, the sable-fish, and the mullet. Turtle and alligators are also met with.

The province of Bengal is poor in mineral productions. The hills in Silhet produce iron ore. Iron is made at Pundnah by a curious process, which at once smelts the ore and renders it malleable. Granular iron ore of the fineness of sand is washed clean and mixed with water into a soft mass; bits of reed, sticks, or leaves are then dipped in it, and take up as much as they will hold, and these, when pretty dry, are thrown into the top of a small clay cupola furnace and melted. It appears, from this detail, that the ore must possess a great degree of purity. The ore might be collected in large quantities, and as limestone of good quality and coal are found in the same range of hills, the smelting might be easily effected. Some petroleum springs exist in the same district. Coal is abundant also in the Jungle Mahals, whence it can be easily conveyed to Calcutta in the rainy season, down the

Damuda river. Coal and iron ore are both of them procured in Birbhoon, and iron-works have long been carried on there by the natives. Extensive forests occur in the neighbourhood of these works, and the smelting is performed by means of charcoal.

Manufactures.—The chief of these are such as are called for by the various agricultural industries, and by the daily wants of the enormous population of Bengal. Weaving and the manufacture of cotton thread occupy large numbers in every district; and carpenters, blacksmiths, goldsmiths, potters, and oil-sellers are settled in almost every village. The manufacture of beads, which are universally worn in necklaces by the lower orders of Hindus, is a very common occupation, in which women take a large share. The weaving of wicker and basket work, and the making of shoes, are the occupations chiefly of the Muchi class, a low caste. All the gold and most of the copper in circulation in India is coined in Bengal.

Trade and Communications.—The external commerce of Bengal is of great magnitude, and is mostly carried on at the port of Calcutta. The value of the imports in 1855 was only £7,250,000, and of the exports rather less; in 1882 they had increased to £22,000,000 and £32,000,000 respectively. From the United Kingdom alone no less than £18,000,000 worth of goods were imported; while the value of Bengal produce sent to this country was £22,000,000. The chief imports were beer and ale, cotton yarn, and cotton manufactures; and the principal articles exported to the United Kingdom were rice, jute, tea, wheat, indigo, seeds (flax and linseed, and rape), and hides.

The Ganges, the Brahmaputra, and on a much smaller scale the Mahanadi in Orissa, with the Eastern Bengal Railway and the great East Indian Line, form the main arteries of commerce. From these great channels a network of minor streams, and a fairly adequate although not yet complete system of raised roads, radiate to the remotest districts. The larger transactions of commerce are conducted in the cities, such as Calcutta and Patna, and in great rural marts, which have grown up under British rule. The smaller operations of trade are effected by means of village markets and countless *hats* or open-air weekly bazaars in every district. The mails are conveyed by railways as far as these extend, then by mail-cart and horseback a distance of 230 miles, and 11,000 miles by runners, boats, and sea.

Population.—Within the provinces under the lieutenant-governor of Bengal dwell a great congeries of people of widely diverse origin, speaking different languages, and representing far-separated eras of civilization. At the date of the census of 1872 they numbered 66,856,859 souls—a population equal then to the whole inhabitants of England and Wales, the United States, and Belgium. The area of these three countries together is 3,644,489 square miles, but the immense population of Bengal was comprised within 156,081. Part of the province is comparatively thinly populated, and taking only Lower Bengal and Behar it was found that 56,000,000 of the people were contained within 120,000 square miles. Over the whole presidency the density was 488 to the square mile. In 1874 the district of Assam ceased to form part of the Bengal Presidency, but even with this omission the population in 1881 was 66,530,127.

Bengal is inhabited by a great variety of races, those broadly designated as Hindus comprising 42,674,000 of the people. The conquest of India in the thirteenth century by the followers of Mohammed brought that sect into the province, and they now amount to 20,664,000, and are increasing. Buddhists number 85,000; Christians, 93,000; and others, 2,351,000.

The hilly country which forms the northern and eastern boundary of Bengal is inhabited by a race whose features prove them to have been of Tartar origin. Towards the

west there is a mixed population, made up of various races, among whom Mohammedans and Afghans are considered to be the most numerous.

The Bengalese are in general men of handsome features and lively dispositions, but wanting in bodily strength, and of weak constitutions. Their manners towards superiors are mild, and their general character is that of pusillanimity. An excellent work illustrative of the various races of Bengal is "Descriptive Ethnology of Bengal," by Colonel Dalton, C.S.I. (Calcutta, 1873).

Revenue.—The public revenue is derived from the land tax and subsidies from protected native states; mint, post-office, stamp, customs, and excise duties; judicial fees and fines, income tax, and the opium monopoly. The total amount in 1882 was £18,530,000, of which £7,000,000 was derived from the sale of opium—partly grown in the North-west Province, but all credited to Bengal, and at least another £1,000,000 for the proportion of the customs and salt duties, which should also be credited to the North-west. This leaves £11,500,000 sterling of revenue of all kinds—imperial, provincial, local, and municipal—or about 3s. 6d. a head. This is much below the rate paid in the more recently acquired provinces; yet, notwithstanding such a singularly light taxation, official returns show that Bengal contributes about one-third of the whole Indian revenue, while her "charges" represent less than one-sixth of the whole Indian expenditure, and that she frequently yields a surplus for imperial demands of nearly £10,000,000.

Throughout the greater portion of Bengal the land revenue was permanently fixed in the last century by Lord Cornwallis, and the very large increase to the rents, which is mainly due to the increased prosperity and security of the country, has passed into the hands of private individuals. These private rights have been divided and subdivided by a process of subinfeudation, the original proprietor having long ago converted his interest in his estates into a permanent rent-charge on the land; and the practice of subletting in integral or fractional parts has gone on until it will be found that where the rent of an estate has increased, say, from £200, the government charge, to £1000, instead of a single zemindar enjoying the £800 per annum, this sum is shared by four or five grades of landowners, each with a perpetual interest in the land, and each often consisting of many co-partners. In spite, however, of the permanent settlement, the land revenue of Bengal increases slowly from lapses and other causes, and now yields not far short of £4,000,000 sterling.

Opium for the China market is the most lucrative source of revenue in Bengal next to that derived from the land, yielding about £5,000,000 per annum, after the cost and charges have been paid. The system of raising the opium revenue pursued in Bombay and Bengal are different. In the former all that is done is to levy a heavy duty on the opium as it enters British territory from the native states of Central India, where it is grown and manufactured. On the Bengal side advances of money are made by the government to the ryots to enable them to grow the plant, and the manufacture is under the charge of a special department. The sales take place in the open market in Calcutta, and the profits are even larger than those realized by the duty at Bombay. The opium thus sold in Calcutta is termed "provision" opium, while that portion which is sold at the government treasuries to licensed retail vendors for consumption in the country is called "excise" opium.

Administration, &c.—The lieutenant-governor is the chief executive authority in Bengal, which for administrative purposes is divided into nine divisions embracing forty-three districts, each division being under the superintendence of a commissioner, and each district under a district officer, who is the unit of executive administration. He is the executive chief and administrator of the tract of country committed to his charge, and is supreme in the district, except in so far

as regards the proceedings of the courts of justice. Each district is again subdivided into *tahsils* or subdivisions, under subordinate magisterial and revenue authorities, styled subdivisional officers; and subdivisions are again divided into *thanas* or police circles. The forty-three districts are either regulation or non-regulation districts. The first are those whose advanced state has rendered it expedient to place them under the complete system of Anglo-Indian law. The second consist of tracts inhabited by primitive races, for whom a less formal code is better adapted, or of semi-independent or tributary states. For making laws and regulations in the presidency, the legislative authority is a council presided over by the lieutenant-governor; and before any law comes into force it must have the assent of the governor-general as well as that of the lieutenant-general.

The army employed in the territories under the lieutenant-governor of Bengal (which cover an area as large as the whole of Germany) numbers only about 12,000 officers and men. Of this small force 4670 are stationed in Calcutta and its environs, 6890 guard the frontiers, and about 600 are located in Chissa. The European troops number 3000, the other 9000 being native officers and men. The government is a purely civil one, the existence of any armed force being less realized than in the quietest county of England. Of the 65,000,000 people in Bengal probably 40,000,000 go through life without once seeing the gleam of a bayonet or the face of a soldier.

Education has made rapid strides in this presidency. In 1855 the number of schools under government inspection was 121, with 11,100 pupils. In 1883 the primary schools had 370,000 scholars in attendance, and the secondary schools 125,000. The grant-in aid principle is generally in force. With few exceptions, the primary and secondary schools, and a large portion of the superior schools and colleges, have been founded as private schools, receiving a subsidy from the state on the condition of conforming to certain rules and submitting to government inspection. There are 1124 scholarships annually divided between the primary, secondary, and superior schools; and the general standard of instruction is virtually determined by the standard fixed in the examination for these scholarships. There are twenty principal newspapers, and thirty-six of lesser degree, published in the vernacular; and about twelve newspapers published in English.

The native or feudatory states under Bengal jurisdiction number thirty-two, and extend over an area of 38,379 square miles, with a population of 2,320,000. The several provinces and principal towns of Bengal are described in separate articles; the general description and history of India are given under INDIA; the general account of the British dominion and government under EAST INDIA COMPANY and INDIA; and the particular histories and descriptions under the names of the presidencies, provinces, states, and cities.

Progress of English Political Power in Bengal.—The commencement of the power of the English in Bengal dates from the year 1652, when, through the influence of a medical gentleman who had been sent to the court of the Mogul, where he had successfully applied his professional skill, a license was given permitting the English East India Company to trade to an unlimited extent free from all payment of customs duties; this privilege was granted upon payment of the merely nominal sum of 3000 rupees. The first settlement made by the English in the province appears to have been at the town of Hoogly, 23 miles higher up the river than the city of Calcutta. The station here formed was considered subordinate to the Presidency of Surat.

It was not until 1698 that the English factory was removed from Hoogly to Calcutta, and that Fort William was built. This station was obtained by purchase as a zemindary. In 1707 Calcutta was made a separate presidency. In 1717 the company obtained a license from the Mogul,

permitting the purchase of lands contiguous to the factory, and confirming the exemption of their trade from duties. In 1756 an attack made on Calcutta by the Subahdar of Bengal, Surajah Dowlah, led to Lord Clive's victory at Plassey, which established the absolute dominion of the English in that country, although the *dewanee*, or authority to collect the revenue, was not formally given by the Mogul Shah Allum until the 12th of August, 1765. Previously to this session the possessions of the East India Company in Bengal were, the factories of Cossimbazar, Dacca, and Calcutta, with a district in the vicinity of the last-named city denominated the Twenty-four Pergannahs, situated principally to the south of Calcutta, on the east side of the Hoogly river. The grant of this district was made in the first instance (1759) as the personal *jaghire*, or leasehold estate, of Lord Clive, by whom it was enjoyed until 1775, when it came into the full possession of the East India Company.

The grant of the *dewanee* already mentioned was contrary to the wishes of Meer Cossim, then subahdar or nabob of Bengal. Such, however, was the power of the English that he was obliged to submit, and made over the management of the province, with all its advantages, to the company, upon the assignment of an annual pension equal to nearly half a million sterling. This pension, greatly reduced in amount, has been since paid to the family of the nabob. At the same time an annual payment of twenty-six lacs of rupees, at that time equal to about £300,000, was promised on the part of the company to the Mogul Shah Allum; but this annuity was considered to be forfeited when, in 1771, that prince placed himself voluntarily in the hands of the Marhattas.

Since the occurrence of these events the English have remained undisputed masters of Bengal, the capital of which has become the seat of government, the governors of the other presidencies being made subordinate.

BENGAL' BAY OF, a part of the Indian Ocean, which washes the southern shores of the Presidency of Bengal. Its north shore is about 250 miles broad; its side on the ocean is about 1200 miles. The Bay of Bengal receives the Ganges and Brahmaputra on the north, the Irrawaddy on the east, the Mahanuddy, Godavery, and Krishna on the west. On the east coast there are many good ports, such as Aracan, Cheduba, Negrais, Syriam, Martaban, Tavay River, King's Island, besides others in the islands between Pegu and Sumatra.

BENGALI' LANGUAGE. The Bengali language is the colloquial medium of a population of more than 20,000,000, spread over a territory of about 100,000 square miles of Northern India. The alphabet employed by the natives in writing, and adopted by Europeans in printing books in the Bengali language, is evidently borrowed from the Devanagari, the character peculiarly appropriated to fix the Sanskrit language; both comprise fourteen vowels and diphthongs and thirty-three consonants. The resemblance in form which the Bengali bears to the Devanagari character is nearly the same as that of the current English handwriting to the form of letters employed in printing. The groundwork of the Bengali language is altogether Sanskrit, just as that of the Italian or Spanish is Latin, with a comparatively small addition of words which cannot be traced to that source. But the refined system of grammatical inflections which constitutes so prominent a characteristic of the Sanskrit language has in Bengali almost entirely disappeared, and the want of terminations, marking the cases and numbers of the noun or the persons and tenses of the verb, is supplied by particles and other auxiliary words often rather clumsily subjoined (hardly ever prefixed) to the mutilated stems of Sanskrit words. The Bengali has, however, preserved to a very considerable extent the faculty so conspicuous in Sanskrit of forming compound words, and some writers have largely availed themselves of this advantage, especially in treatises on

Hindu law and on philosophical subjects; we allude especially to the Bengali translation of the second book of the "Mitakshara" (a Sanskrit law-book of high authority), published by Lakshmi Narayana Nyayalankara, and to that of the "Nyayadarsana," by Kasinatha Tarkopanchanana.

A new epoch in Bengali literature was begun with the foundation of the College of Fort William near Calcutta, and with the labours of Dr. Carey and his colleagues, the Serampore missionaries. The Bible and various works of modern literature were translated into Bengali and printed—among others, Bunyan's "Pilgrim's Progress," by F. Carey (Serampore, 1821); "Rasselas," by Rajah Krishnachandra Roy; and the "Discourse on the Advantages of Knowledge," published by the Society for the Diffusion of Useful Knowledge. At the same time various elementary works were printed, partly by the mission press at Serampore, and partly under the superintendence of the Calcutta School-book Society. An impulse was thus given to the cultivation of the language amongst Europeans as well as among the natives, and the taste of the latter for reading is attested by the fact that several newspapers in the Bengali language are circulated in Calcutta and its vicinity.

BENGAZI (ancient *Hesperis* and *Berenice*), a seaport of Tunis, North Africa, in the province of Barca, stands on the east coast of the Gulf of Sidra (ancient *Syrtis Major*). It is finely situated on the margin of an extensive and very fertile plain, but is miserably built, filthy in the extreme, and infested to an almost intolerable extent with flies. There is an ancient castle, a Franciscan monastery, and a mosque. The harbour, which formerly had deep water, is filled up, so that it cannot now be entered by vessels drawing more than 7 or 8 feet of water, and that only in moderate weather. Notwithstanding its poverty and the indolence of its Arab inhabitants, Bengazi has some trade, principally carried on by Jews chiefly with the other Barbary states and Malta.

It is believed that Bengazi occupies the site of the ancient Berenice, which had the gardens of the Hesperides in its vicinity. It is singular that though its walls were completely repaired under Justinian, hardly a trace of them is now to be met with. In fact, scarce a vestige of the old city is to be found above the surface of the plain; but very extensive remains have been discovered on digging a foot or two below the surface.

BENGUELA, a country on the west coast of Africa, between 10° and 17° S. lat., formerly one of the provinces of the kingdom of Congo. It lies between the rivers Angola and Coanza. The climate is unhealthy on the coast, and fever is prevalent. It was visited by Battel in 1589, by Angelo and Carl in 1667, by Merolla in 1682, by Barbot in 1688, and by Bowdich, Vidal, Owen, and others in later years.

The interior of the country is mountainous, well watered, highly productive, and rich in minerals. Most of the physical and social features of the country seem to resemble pretty closely those of the neighbouring region of ANGOLA. The Portuguese occupy a few stations, of which the chief is San Felipe, which has, however, much declined.

BENI is the *status constructus* of the plural of the Arabic word *ibn* or *ibn*, a son. It occurs in eastern geography as a component part of many names of families or tribes, as *Beni Temim*, the sons of Temim—i.e. the tribe of Temim, or the Temimides; and *Beni Omayyah*, the sons of Omayyah—i.e. the family known in history under the current name of the Ommyades.

BENICARLO, a seaport in Spain, in the province of Castellon. It is situated on the Mediterranean, and has a good trade in full-bodied wines, which are exported for mixing with clarets and other French wines. The population is 7000.

BENI-HAS-SAN-EL-QUADYM, or Old Beni-Hassan, a very large village of Middle Egypt, near the east bank of

the Nile. It is called the "Old" to distinguish it from another village, a little to the south of it and nearer to the Nile, which was founded in the last century, when the inhabitants of Beni-Hassan-el-Quadym were driven, by the encroachment of the sands upon the grounds around the village, to seek a more eligible site. But although abandoned, the village is not ruined. The place is of no importance but as marking the site of the catacombs in the neighbourhood, which are among the finest and most interesting in Egypt. The most important of these are in a calcareous mountain to the north of Beni-Hassan-el-Quadym; and near them, in what was once the bed of a steep torrent, is a large natural cave, which probably gave to the spot its Greek name of *Speos Artemidos*, or Cave of Artemis. The excavations, about thirty in number, are all at the same height in the rock, and all have their entrances on the same platform. They are considered to have been the cemeteries of the principal families of Hermopolis, which town is directly opposite to them on the other side of the river.

Many of the catacombs are of considerable extent, consisting of one, two, or three apartments each; the largest of which is about 60 feet in length by 40 in breadth. In front of the principal excavations are small porticoes of four or more columns; other columns from 12 to 18 feet high, and like the oldest Grecian Doric columns, support the roof. The walls and columns in the interior of the catacombs are covered with paintings representing the endless variety of domestic and rural occupations, some of which are in perfect preservation, and the colours are as vivid as if recently applied. Among the most interesting of the paintings are representations of fishing, dancing, gymnastic exercises, single combats, of which no less than 180 are painted in one of the catacombs; an antelope hunt and the punishment of the basinado represented such as may be seen at the present time.

BENI-ISRAEL (Sons of Israel), a remarkable race found in the west of India. They preserve a tradition of Israelitish descent, are all circumcised, and have always acknowledged the Mosaic law, though their practices are not free from the idolatry of their neighbours. In appearance they are lighter in colour than the other natives of India, and their physiognomy resembles that of the Arabian Jews. They have lived in India for many centuries, their first settlement being at Navangam, about 30 miles from Bombay. Their origin is uncertain, but Dr. Wilson believes them to be a remnant of the Ten Tribes. (*Indian Antiquary*, 1874.)

BENIN, BIGHT OF, in the Gulf of Guinea, is contained between Cape Formosa to the east, and Cape St. Paul to the west, the distance between them being about 370 miles in an east-by-south direction. It may be described as one continuous line of low, marshy, sandy shore, intersected by numerous rivers and estuaries, more especially towards Cape Formosa, where they form alluvial islands, which are part of the delta of the Niger. The swampy nature of the soil extends in some places upwards of 50 miles inland. The coast is overgrown in most parts with mangroves and other aquatic plants; in the wet season large tracts are inundated. The principal towns along the coast are Quitta, Great and Little Popoe, Whydah, Porto Novo, the seaport of Ardrah, Badagry, and Lagos. The principal rivers which empty themselves into this bight are the Lagos, Benin, Escardos, Forcados, Ramos, Dodo, and Sengama, all of which, except the Lagos, communicate with each other and with the Niger. The coast shoals gradually and regularly, so that a vessel may run along it, keeping in soundings of 40 to 50 feet, with stiff muddy bottom, at the distance of about 4 miles from the beach. A slow current always sets along the shore to the eastward. The prevailing winds are from the west, and the coast is subject to violent tornadoes from the north-east.

The chief articles of trade at the towns on the coast, as well as up the rivers, are palm-oil and ivory.

BENIN' RIVER, formerly called by the Portuguese Rio Formosa, is the western arm of the Niger. It empties itself into the Bight of Benin, about 115 miles to the N.N.W. of Cape Formosa. At its mouth it is about 2 miles wide, and has across it a bar of mud, clay, and sand, on which there is not more than 12 or 13 feet at low-water spring-tides. A short distance from the sea its width diminishes to half a mile, and at New Town, 18 miles up, it is little more than 500 yards across. The depth of water does not exceed 24 feet in any part. This river, like all the others on the coast, is pestilentially unhealthy; the disease is a malignant remittent fever. The tide flows six hours at full and change, and rises 5 or 6 feet; during the ebb, it flows away portions of the river banks.

BENITIER or **BENATURA** (Fr. *benir*, to bless), the name given in Roman Catholic countries to the vessel used to contain the holy water. Portable benitiers are employed in processions, and these are usually made of metal. Fixed benitiers are generally placed near the doors of churches, so that the worshippers may conveniently dip their fingers in on entering or leaving.

BEN JAMIN (the gum). See BENZON.

BEN JAMIN, the youngest of the sons of Jacob, and the head of one of the tribes of Israel. His mother, Rachel, died in giving him birth, and before departing called him Ben-oni, "the son of my sorrow;" but his father changed his name to Ben-jamin, "the son of my right hand." In the narrative of the journeys of the sons of Jacob to Egypt during the famine he is spoken of as "a lad," and "a little one" (Gen. xliii. xlv.); but in the account given of those who went down with Jacob to Egypt we find he is described as being the father of ten sons. In the enumeration of the people during the wilderness journey (given in Num. xxvi.) the tribe of Benjamin is set down as consisting of 45,600 men able to go to war, of twenty years old and upwards. In the division of the Land of Canaan the tribe of Benjamin were allotted a district between Ephraim and Judah about 26 miles in length by 12 in breadth—a domain rather larger than the county of Middlesex; but they appear to have subsequently extended their borders. They seem to have been a warlike and high-spirited people, and their pugnacity appears at one time to have threatened their destruction. The story of the civil war caused by their determination to defend the criminals of Gibeon is recorded in the Book of Judges (chaps. xix. and xx.), and according to this account the tribe was reduced to 600 young men, who had succeeded in hiding themselves at the period of slaughter in the caves of the rock Rimmon. On the death of Saul the tribe at first supported his sons, but afterwards became united to David. At the disruption of the kingdom the tribe of Benjamin remained with Judah. The two tribes formed the kingdom of Judah, as opposed to that of Israel. Its history is therefore that of the southern kingdom.

BEN'NETT, SIR WILLIAM STERN DALE, for some twenty years the head of the musical profession in England, was born in 1816 at Sheffield, where his father was an organist. He received his first musical education under his grandfather, and in 1826 left the choir of King's College Chapel, Cambridge, for the Royal Academy of Music, where he remained ten years. It was during this time that he wrote several of his most appreciated works. He subsequently paid several visits to Germany, attracted thither by the fame of Mendelssohn, whose personal acquaintance he had already made at the Academy, where the distinguished musician, in his generous way, had warmly encouraged the young student on the production of an early work. One of the most absurd ideas was that very often heard during the earlier part of Sterndale Bennett's career, namely, that he was a mere imitator of Mendelssohn. His

works are few, but they are all strongly individual, and indeed a high authority claims for this composer the distinction of being the only truly original classical composer of our country since Purcell. The notion alluded to has been crushed out by the great and growing popularity of the delicate and highly-finished works for which music is indebted to this most fastidious of all composers. In 1856 Sterndale Bennett became professor of music at Cambridge University, and conductor of the Philharmonic concerts. The last appointment he resigned in 1866, when he accepted the principalship of the Royal Academy of Music. He had been invited to direct the famous Gewandhaus concerts at Leipzig, but his patriotism had dictated a refusal. His "May Queen" (1858, Leeds festival) is the most beautiful and also (strange to say) the most popular of cantatas, and his "Woman of Samaria" (1867, Birmingham festival) is ranked amongst the best oratorios after those of Handel and Mendelssohn. In 1870 the University of Oxford conferred the degree of D.C.L. upon him, and in 1871 he accepted the distinction of knighthood. A public testimonial was presented to him, at a great public meeting in St. James' Hall in 1872, for his distinguished services to the art—the Sterndale Bennett scholarships at the Royal Academy of Music being founded with part of the money subscribed. He died in February, 1875, and was honoured with a funeral in Westminster Abbey.

BENT GRASS, a name given to various species of *Agrostis* which creep and root by their bent and wiry stems, whence it becomes exceedingly difficult to eradicate them from any soil of which they have taken possession.

BENTHAM, JEREMY, was born at the residence of his father, Mr. Jeremiah Bentham, an eminent solicitor, adjacent to Aldgate Church in London, on the 15th of February, 1747. At eight years of age he entered Westminster School, and at thirteen he was admitted a member of Queen's College, Oxford. The age at which he entered Oxford belongs more to the practice of former times than that of later years. At sixteen he took his degree of B.A., and at twenty that of M.A. At Oxford Bentham was one of the class who attended the lectures of Blackstone on English law. His "Fragment on Government" shows at how early an age he began to feel dissatisfied with that writer.

Bentham's prospects of success at the bar were extremely good, his father's practice and influence as a solicitor being considerable; but circumstances led to his retiring from the profession, which he relates in one of his pamphlets ("Indications respecting Lord Eldon"). He had been called to the bar in 1772, or "thereabouts," as he says. In 1776 appeared his first publication, entitled "A Fragment on Government," which was in a great measure an attack on the introductory part of Blackstone's "Commentaries." This work, being anonymous, was ascribed to some of the most distinguished men of the day. Dr. Johnson attributed it to Mr. Dunning. In 1780 his "Introduction to the Principles of Morals and Legislation" was first printed, but it was not published till 1789.

He visited Paris in 1785 for the third time, and thence proceeded to Italy. From Leghorn he sailed for Smyrna, whence he sailed to Constantinople, where he remained five or six weeks. From Constantinople Mr. Bentham made his way across Bulgaria, Wallachia, Moldavia, and through a part of Poland, to Cricheff in White Russia. He returned to England through Poland, Germany, and the United Provinces in February, 1788.

In 1791 was published his "Panopticon, or the Inspection House," a valuable work on prison discipline, part of which consists of a series of letters, written in 1787, from Cricheff, where also he wrote his letters on the usury laws. In 1792 Mr. Bentham presented to Mr. Pitt a proposal formed on his Panopticon plan of management. It was embraced with enthusiasm by Mr. Pitt; Lord Dundas, home secretary; Mr. Rose, secretary of the treasury; and

Mr. Long, afterwards Sir Charles Long, and subsequently Lord Farnborough. Notwithstanding that enthusiasm it was made to linger for several years, and finally was given up altogether; for after land, subsequently occupied by the Milbank Penitentiary, had been paid for at the price of £12,000, the whole was stopped for the want of the signature of George III. to a certain treasury document, for the issue of £1000, as a compensation for the surrender of some leases to enable him to enter into actual possession. Mr. Bentham's plan for 1000 prisoners would have cost the public between £20,000 and £30,000; the adopted plan, for 600 prisoners, cost several times that sum.

From about the year 1817 Mr. Bentham was a bencher of Lincoln's Inn. He died in Queen's Square Place, Westminster, where he had resided nearly half a century, on the 6th of June, 1832, being in the eighty-fifth year of his age. Up to extreme old age he retained, with much of the intellectual power of the prime of manhood, the simplicity and the freshness of early youth; and even in the last moments of his existence the serenity and cheerfulness of his mind did not desert him.

"He was capable," says his friend Dr. Southwood Smith, to whom he bequeathed his body for the purposes of anatomical science, in the lecture delivered over his remains, "of great severity and continuity of mental labour. For upwards of half a century he devoted seldom less than eight, often ten, and occasionally twelve hours of every day to intense study. This was the more remarkable, as his physical constitution was by no means strong. His health during the periods of childhood, youth, and adolescence was infirm; it was not until the age of manhood that it acquired some degree of vigour; but that vigour increased with advancing age, so that during the space of sixty years he never laboured under any serious malady, and rarely suffered even from slight indisposition; and at the age of eighty-four he looked no older, and constitutionally was not older, than most men are at sixty—thus adding another illustrious name to the splendid catalogue which establishes the fact, that severe and constant mental labour is not incompatible with health and longevity, but conducive to both, provided the mind be unanxious and the habits temperate."

Bentham's lot in life was a peculiarly happy one, though unattended with a very widely diffused reputation in his native country, and though exposed to the attacks of contemporary writers. His easy circumstances and his excellent health enabled him to devote his whole time and energies to those pursuits which exercised his highest faculties, and were to him a rich and unfailing source of the most delightful excitement. On the other hand, his retired habits preserved him from personal contact with any but those who valued his acquaintance; and, as for the writers who spoke of him with ridicule and contempt, he never read them, and therefore they never disturbed the serenity of his mind, or ruffled the tranquil surface of his contemplative and happy life.

The leading principle of Bentham's philosophy is, that the end of all human actions and morality is happiness. By happiness Bentham means pleasure and exemption from pain; and the fundamental principle from which he starts is, that the actions of sentient beings are wholly governed by pleasure and pain. He held that happiness is the *summum bonum*, in fact, the only thing desirable in itself; that all other things are desirable solely as means to that end; that, therefore, the production of the greatest possible amount of happiness is the only fit object of all human exertion, and consequently of all morals and legislation.

Dr. Priestley, in a criticism of Blackstone which appeared before that of Bentham, incidentally used an expression of Beccaria's, to the effect that "the greatest happiness of the greatest number" was the only intelligible rule of government. This principle was taken by Bentham

as the foundation of his philosophy, and as a motto for which he demanded universal acceptance. It is this principle that is implied in the term "utilitarian" applied to the philosophy of Bentham as taught and expounded by his illustrious followers, Dupont, James Mill, Romilly, Bowring, Southwood Smith, and John Stuart Mill. The phrase and the term, though by no means unexceptionable, have done good service in their day as watchwords of reform, while the ideas and teachings of Bentham have exercised the most beneficial results in the same direction.

In the mitigation of the criminal code, in parliamentary and municipal reform, in the abolition of oaths, in the reduction of taxes upon knowledge, and in many other measures which modern legislation has accomplished, the name of Jeremy Bentham is honourably associated with the foremost men of his age.

Bentham's principal works were the "Introduction to the Principles of Morals and Legislation;" the "Fragment on Government;" the "Rationale of Judicial Evidence," in five volumes; the "Book of Fallacies;" the "Plan of a Judicial Establishment," one of his most finished productions, printed in 1792, but never regularly published; his "Defence of Usury;" "Pannopticon," an admirable work on prison discipline; "Constitutional Code," and many others. The best edition of his complete works is that edited by his executor, Sir John Bowring, in eleven closely printed octavo volumes, of which the last was published in 1843. Another work entitled "Benthamia," published in 1838, by Dr. Hill Burton, contains, in addition to a memoir and introductory essay, a collection of passages from his writings explaining the principal points of his teaching.

With reference to the works published by Bentham it may be noticed that his early writings display much ease and elegance of style, and are remarkable for the force they display. His later works are of a different character, and are often so involved and obscure, and so loaded with technical terms, that they almost need an interpreter to make them intelligible. To M. Dupont, a refugee from Geneva, he was indebted for giving shape and coherence to many of his scattered speculations, and translating them into elegant French, so that for a long time Bentham was better known upon the Continent than in his native country.

BENTINCK, LORD GEORGE FREDERICK CAVENDISH, third son of the fourth Duke of Portland, was born in February, 1802. He was early destined for the army, but finding no chance of employment or promotion in that profession he became private secretary to his uncle, Mr. Canning, and in 1826 was chosen M.P. for Lynn Regis, which he continued to represent down to the period of his death. He entered Parliament with strong Liberal opinions, and voted for Catholic emancipation and for the principles of the Reform Bill. In 1834 he deserted the ranks of the Whig party, together with his friend Lord Stanley, to whose judgment he always looked up with the greatest reverence and respect. From that time until 1845 he was a staunch follower and supporter of Sir Robert Peel, who offered him a post in the ministry he had formed in 1841. The offer, however, was declined by Lord G. Bentinck, on account of his passionate attachment to the sports of the field and the raccourse. When Sir Robert Peel, in 1845, announced his intention of abandoning the principles of agricultural protection, and adopting free-trade measures, the "protectionist" party was formed, and Lord G. Bentinck became their leader. From the retirement of an ordinary silent member he suddenly emerged as an effective speaker, a ready debater, and a sound-judging politician. His speeches in the session of 1845-46 were most damaging to the government of Sir Robert Peel. As he never actually held office the qualifications of Lord G. Bentinck were never fairly tested, though he was the author of several important propositions, and of amendments on the measures proposed by his opponents. Among others

we may mention his proposal for advancing £16,000,000 on loan to the Irish railways during the famine of 1846. As a leader in the sporting world his character stood deservedly high, on account of the zeal with which he strove to suppress the dishonest practices of the "turf." He died suddenly whilst walking in his father's park in Nottinghamshire, 21st September, 1848. His life was written by his friend Disraeli.

**BENTINCK, LORD WILLIAM HENRY CA-
VENDISH, G.C.B.**, uncle of the preceding, was born in 1774, and entered the Coldstream Guards in 1791. He was aid-de-camp to the Duke of York in Flanders, and to Lord Moira's expedition against the coast of France, and subsequently served in Italy and Egypt. From 1803 to 1808 he was governor of Madras, and in the latter year went to Portugal on the staff of Sir H. Burrard. He was present at Comma, and held the command of a division in Lord Wellington's army. He was subsequently sent as British minister to the court of Naples, and commander-in-chief of the British forces in that kingdom, in which capacity he was enabled to prevail on King Ferdinand to grant his subjects the benefits of a free constitution. He sat in Parliament between 1796 and 1826 as member for Camelford, Nottinghamshire, and Ashburton. In 1827 he was sworn a privy councillor, and appointed governor-general of India in succession to Lord Amherst. His Indian career is remarkable for two projects of national importance undertaken during his tenure of office—the opening up of a communication between British India and the countries west of the Indus as far as the Caspian Sea, and the establishment of an overland communication between England and India. On returning to England in 1835 he was elected member of Parliament for Glasgow, which city he represented down to within a few days of his death. He died at Paris on the 17th June, 1839.

BENTINCK, WILLIAM H. C., third duke of Portland, born in 1738, was a distinguished statesman during the eventful reign of George III. He began life as a Whig, and held office under Lord Rockingham in 1765, and again in 1782, when he was appointed lord lieutenant of Ireland. He was prime minister of the famous coalition cabinet composed of Fox and Lord North, with their respective friends. The University of Oxford elected him to the office of chancellor in 1792. He was a member of Addington's administration in 1801. On the downfall of the Whig ministry in 1807 he was appointed first lord of the Treasury. He died on the 30th November, 1809.

BENTLEY, RICHARD, born 27th January, 1662, at Oulton, near Wakefield, in Yorkshire. He was educated at the grammar-school of Wakefield, and at St. John's College, Cambridge, of which he was admitted a sizar, 24th May, 1676. No fellowship falling vacant to which he was eligible, he accepted the mastership of the grammar-school of Spalding in Lincolnshire early in 1682. After holding that office for a year he resigned it to become private tutor to the son of Dr. Stillingfleet, afterwards Bishop of Worcester. He accompanied his pupil to Oxford, where he was admitted to the degree of M.A. His residence at Oxford contributed to advance his reputation and learning; he had access to the manuscripts of the Bodleian Library, and became intimate with several distinguished members of the university, especially Mill, the editor of the Greek Testament, and Bernard, the Savilian professor.

Bentley was ordained deacon in March, 1690. In 1692 he obtained the first nomination to the lectureship newly founded under the will of Mr. Boyle, in defence of religion, natural and revealed. He chose for his subject the confutation of atheism. In October, 1692, he was rewarded with a stall at Worcester, and in the following year was appointed keeper of the King's Library. In 1694 he was reappointed Boyle lecturer, and followed up his refutation of atheism by a defence of Christianity against the attacks

of infidels. This second series of sermons was never published. In 1696 he took the degree of D.D. at Cambridge.

Bentley's appointment to the office of king's librarian was the accidental cause of his writing the "Dissertation on the Epistles of Phalaris." The controversy between Boyle and Bentley arose out of an alleged want of courtesy on the part of Bentley, relative to the loan of a MS. from the King's Library to the Hon. C. Boyle, an undergraduate of Christ's Church, Oxford, who had undertaken to edit the "Epistles," and who resented the supposed slight in a pettish passage in the preface (1st January, 1696). It happened that Bentley had made up his mind that the "Epistles" ascribed to Phalaris were spurious, before this quarrel occurred; and in 1697 he stated the grounds of his conclusion in an Appendix to the second edition of Wotton's "Reflections on Ancient and Modern Learning." At the end of it he notices the unjust charge made against him by Boyle, whose performance he criticises with much asperity. Upon this a knot of the best scholars and wits of Christ Church united to punish Bentley, not by fair argument, but by every artifice which wit and malice could devise. The joint work, in which Atterbury was the chief performer, appeared in March, 1698, and was entitled "Dr. Bentley's Dissertations on the Epistles of Phalaris and the Fables of Æsop examined, by the Honourable Charles Boyle." It obtained such a degree of popularity as gives some reason for supposing that Bentley had already made himself disliked for that presumptuous arrogance which he displayed in after-life. Bentley took time to mature his answer, and in the beginning of 1699 published his enlarged "Dissertations on the Epistles of Phalaris," which finally set at rest the question in dispute. This, however, is the least part of the merits of the work. Professedly controversial, it embodies a mass of accurate information relative to historical facts, antiquities, chronology, and philology, such as has rarely been collected; and the reader cannot fail to admire the ingenuity with which things apparently trifling, or foreign to the point in question, are made effective in illustrating or proving the author's views. The publication of this work not only fully established Bentley's reputation for profound scholarship, but "it inaugurated a new era in the art of criticism."

In 1700, Bentley, by the gift of the crown, was instituted master of Trinity College, Cambridge, and resigned his stall at Worcester. Several works of high scholarship now proceeded from his pen. He also made an important improvement in the system of college examinations for fellowships and scholarships, by substituting for the old and loose method of oral examination that system of written exercises which is still pursued, improved the college library, &c. Bentley's conduct in other collegiate affairs was far from praiseworthy.

It shows the remarkable activity and energy of Bentley's mind, that the harassing quarrels, due to his arbitrary rule, which occupied so large a portion of his time and attention, interfered very little with his critical pursuits. His edition of "Terence," published in 1726, is almost unique. The text professes to be corrected in no less than a thousand places, and the reasons for almost every change are given in the notes.

In 1731 Bentley undertook an edition of the "Paradise Lost." He proceeded on a supposition, first started by Elijah Fenton, that Milton, by his blindness, being obliged to employ an amanuensis, his poem might reasonably be supposed to have been much corrupted between its delivery from his own lips and its issue from the press. Bentley does not appear to have had much poetic feeling.

In 1739 Bentley's labours were interrupted by a paralytic stroke. He recovered sufficiently to be able to amuse himself; and the concluding years of his life were spent in the enjoyment of the society of his family and of a few friends. Richard Cumberland, the dramatist, was his grandson by his daughter Joanna, and has left in his

Memoirs a pleasing account of the veteran scholar's condescension and good nature. Mrs. Bentley died in 1740, and Bentley survived her little more than two years. He died 14th July, 1742, and was interred in the college chapel.

See "Life of Bentley," by Dr. Monk, bishop of Gloucester (one vol. 4to, London, 1830, and two vols. 8vo, London, 1833); also a very interesting memoir of him by Professor Jobb, in "English Men of Letters," published in 1882.

BEN'ZAMIDE, obtained by the action of ammonia on chloride of benzoyl. It is soluble in hot water, the solution crystallizing in pearly crystals belonging to the trimetric system. It melts at 115°C . (239°Fahr.), and contains $\text{C}_7\text{H}_7\text{NO}$.

BEN'ZENE. See BENZOL.

BENZER TA, LAKES OF, two lakes about 30 miles distant from Tunis, about 10 miles long each. The larger is about 6 miles broad, the smaller about 4. The supply of fresh water for the city is chiefly derived from them.

BEN'ZINE. This substance is generally known in commerce as petroleum spirit; it is a mixture of the lighter hydrocarbons derived from the distillation of American petroleum. It resembles benzole from coal-tar, and is often mistaken for it, but differs from it in not being so good a solvent of asphaltum, and in not freezing and not yielding nitro-benzole. It is therefore useless for making aniline colours. [See BENZOL.] It is largely used as a substitute for turpentine, for making paints and varnishes, for dissolving fats and oils from animal and vegetable matter, and for removing grease stains from cloth, kid gloves, &c.

BENZOIC ACID, *Hydrate of Benzoyl, Flowers of Benzoin*. It consists of $\text{C}_7\text{H}_5\text{O}_2$. It is found in several balsams and gum-resins, especially in the gum-resin known as gum-benzoin or benjamin. It occurs in the urine of man, and also in that of gregarious animals. It is the sole product of the oxidation of bitter-almond oil (hydride of benzoyl, $\text{C}_7\text{H}_5\text{O}$) at a moderate temperature, and exists in some other vegetable bodies, as the balsams of Peru and of Tolu, and the flowers of the *Trifolium melilotus officinalis*.

It may be prepared from benzoin either by sublimation or by precipitation; the former method is employed in the British, and the latter in the Berlin Pharmacopœia. It may also be precipitated by muriatic acid from the evaporated urine of the cow and some other animals. The acid obtained in this way has a disagreeable odour, which may be nearly got rid of by boiling it in water with animal charcoal. When fat and tallow are distilled an empyreumatic product is obtained which, if boiled with powdered chalk and water, yields benzoate of lime, and this, upon the addition of muriatic acid, gives benzoic acid.

Benzoic acid when pure is inodorous, but when gently warmed acquires a faint smell. It melts just below 100°C . (212°Fahr.), and sublimes at a temperature a little above this; boils at 289°C . (462°Fahr.), its vapour having a density of 4.27. It burns in contact with the air when strongly heated. It is not affected by nitric acid of ordinary strength, even at a boiling temperature. It is soluble in 200 parts of cold water, and from twenty-four to twenty-eight parts of boiling water. It dissolves in two parts of alcohol, and is very soluble in ether.

The saline compounds of benzoic acid are not very important. The alkaline and earthy salts are generally soluble in water, and so also are some of the metallic benzoates, especially those of manganese, nickel, and cobalt, while the perbenzoate of iron is insoluble. The benzoates of lead, mercury, and silver are among the more insoluble salts of this acid. In its medical uses the sublimed acid is the best form. It occurs in white needle-like prisms, with a silky lustre, a peculiar odour, and a pungent taste. It enters into the composition of the *tinctura camphore composita* and the *tinctura opii ammoniata* of the British Pharmacopœia—two preparations which have been

long popularly known under the name of paregoric elixir. Benzoic acid is used in medicine, in doses of from five to twenty grains, as a stimulant and expectorant.

BEN'ZOIN or **BEN JAMIN**, a gum-resin. It is extracted from the *Styrax benzoin*, which grows in Sumatra, Java, and Borneo, by making incisions in the trunk of the tree in its seventh year. It hardens very quickly, and is imported in a state of brittle masses, which when fractured present a mixture of white, brown, and red grains, frequently as large as an almond. The fracture of benzoïn is conchoidal, and the lustre is greasy; its specific gravity is from 1.063 to 1.092. Its smell is agreeable, resembling that of vanilla. It melts at a moderate heat, and yields benzoic acid, of which it contains from 12 to 20 per cent. It contains, besides benzoic acid and a little volatile oil, three different resins.

In its medicinal action benzoïn resembles the other balsamic resins, being stimulant and expectorant, and increasing the secretions of the mucous membrane of the lungs. It was formerly employed as an expectorant in chronic catarrh and in asthma, and it may occasionally be serviceable when, from deficiency of nervous energy, expectoration is difficult, and an accumulation of mucus takes place in the lungs. It cannot fail, however, to prove hurtful if such an accumulation arises from difficult circulation through the lungs, connected with organic disease of the heart, which is frequently the source of the spasmodic symptoms called asthmatic. It is chiefly employed in perfumery, and as an ingredient in incense, fumigating pastilles, &c.; also in court-plaster, in certain cosmetics, to scent the varnish used for snuff-boxes, walking-sticks, &c. The tincture of benzoïn was formerly much used as an application to cuts and wounds under the name of friar's balsam.

BENZOL, **BENZOL**, or **BEN'ZENE**, an important hydrocarbon (hydride of phenyl) discovered by Faraday in 1825. Its formula is represented by C_6H_6 . It is produced when one part of benzoic acid is distilled with three parts of hydrate of lime; it is also produced by the resolution of benzoic acid at a red heat into benzole and carbonic acid. Benzole is very inflammable, and burns with a luminous but smoky flame. It is a colourless, highly refracting liquid, of sp. gr. 0.85 at $15^{\circ}\cdot5\text{C}$. (60°Fahr.). It boils at 80°C . (176°Fahr.), and freezes at 8°C . (37°Fahr.). It possesses great solvent powers, and is on this account used by manufacturers of india-rubber and gutta-percha. It readily dissolves sulphur, phosphorus, caoutchouc, asphaltum, wax, and fatty bodies generally, now so largely employed in the production of the aniline colours. The great variety of these colours, embracing as they now do every tint of the rainbow, has led to their world-wide application. It is insoluble in water, but soluble in alcohol and ether. It is now largely manufactured from the light oils arising from the distillation of coal-tar, for the preparation of nitro-benzole or nitro-benzene ($\text{C}_6\text{H}_5\text{NO}_2$). This substance is obtained by acting on it with strong nitric acid; it forms the basis of the manufacture of aniline or phenylamine ($\text{C}_6\text{H}_5\text{N}$).

Benzole is the only source available for the production of aniline on a large scale, and therefore the manufacture of this substance has become one of great commercial importance, and has laid the foundation of a new and gigantic industry.

BEN'ZOYL is the supposed radical of the benzoyl series. Among other compounds named from benzoyl, *benzil* ($\text{C}_{14}\text{H}_{10}\text{O}_2$) consists of six-sided transparent, inodorous, and tasteless prisms; *benzitic* or *stilbic acid* ($\text{C}_{14}\text{H}_{12}\text{O}_2$) consists of colourless, transparent, rhomboidal crystals, which unite with bases to form salts, and is formed by the action of oxidizing agents on benzoïn; *benzimidic* ($\text{C}_{12}\text{H}_{10}\text{N}_2\text{O}_2$), formed by the action of alkalis on benzoïn, presents the form of light, pearly, acicular crystals, which are insoluble in water, but are very inflammable.

BEOWULF ("Dee-wolf" or "Woodpecker") is the title, and also the name of the hero, of the one great Anglo-Saxon national epic. It tells how Beowulf fought with the monster Grendel, and afterwards (in the depths of the sea) with Grendel's mother, conquering and slaying both, saving his Danish friend Hrothgar, and winning immortal fame for his own Gothland (probably Sweden). Eventually Beowulf was himself chosen king of Gothland, and grandly closed his life in a triumphant fight against a monstrous fire-breathing dragon. The only MS. extant is a late copy, of about the eighth century, with Christian interpolations. The poem itself may be of about the fifth century. It contains no less than 6357 lines. The standard work for this (and indeed for all Anglo-Saxon poetry) is Grein's "Bibliothek der A. S. Poesie." Kemble's prose translation (1833) is considered good, but his antiquarian knowledge is now out of date, and a good critical English edition of the poem is somewhat needed. As a national relic it may be considered of the highest importance.

BÉRANGER, PIERRE JEAN DE, the famous French lyric poet, was born in Paris in 1780. While yet a child he went to live at Péronne with his aunt, who kept an inn there. Here he continued till the age of sixteen, when he returned to Paris. His first literary attempts were a comedy, and a semipastoral poem called the "Pilgrimage." Both were unsuccessful. In his disappointment he resolved to follow Napoleon to Egypt, but was dissuaded by his friends. He then submitted some of his poems to Napoleon's literary brother Lucien, who showed the poet much consideration. Among other kind deeds he transferred to him the salary to which he was entitled as a member of the Institut. But a separation was soon to take place between the poet and the ruling family. Seeing the fearful excesses to which Napoleon was driving the French nation, in 1814 Béranger wrote the celebrated poem, "Le Roi d'Yvetot," which turned the laugh of the people on the emperor. In 1815 he published his first volume of poems; and in 1821 a second, for which he was prosecuted, condemned to three months' imprisonment and a fine of 500 francs. Under the brief reign of Charles X. he was again prosecuted, and was fined 10,000 francs for his political lampoons. When the revolution of July, 1830, occurred, he was offered a post under government, but he refused. His fame as the poet of the people was now firmly established. His poems were everywhere most popular. In 1833 he took formal leave of the public, and wrote little or nothing afterwards. In 1848, very much against his will, he was elected by an immense number of votes a member of the Assembly. He accepted the seat in acknowledgment of the honour, but soon afterwards resigned. On the advent of Napoleon III. to the imperial throne, private overtures of friendship and pecuniary assistance were made to Béranger both by the emperor and the empress, but he refused to accept anything. He died at Paris, 16th July, 1857.

The cost of his funeral was defrayed by the government, and he was followed to the grave by the most distinguished men of letters of the French nation.

There have been numerous editions of his works. See "Œuvres Complètes de P. J. de Béranger" (new edition, Paris, 1857), also "Mon Biographie," and "Béranger et son Temps," by J. Janin (two vols. 1866).

BER'BERA, a seaport in the Somali country, East Africa, nearly opposite Aden. It is situated at the head of a deep and finely-sheltered bay, and is the best harbour on the Somali coast. The town consists chiefly of an assemblage of huts, generally about 6 or 7 feet in height, built with sticks covered with mats or skins. These huts are erected in November, and are dismantled at the breaking up of the fair in the month of May, when the greater part of the materials are taken away. During the remainder of the year the place is deserted in consequence of the suffocating heat. The trading season commences about

November. The exports consist of sheep for the Mocha market, ghee, coffee, myrrh, benzoin, gum-arabic, elephants' tusks, gold-dust, ostrich feathers, dry hides, and also an article called *wars* in Arabia, which is used as an ointment for cooling the body. The imports consist of blue and white cotton cloth, Indian piece-goods, European prints, silks, silk thread, shawls, red cotton yarn called *shamlah*, beads, sugar, rice, iron, copper, wire, zinc, dates, and a few smaller articles. The trade is carried on chiefly with the towns on the Arabian coast. The water used at Berbera has to be brought from the wells of Baraka, a distance of several miles.

BERBERIDA'CEÆ, an order of plants belonging to the thalamiflora polypetalæ. The petaloid sepals and the petals, generally numbering from four to six of each kind, are arranged in several series, one inside the other. The stamens, usually from four to six, are opposite to the sepals and petals; the anthers burst by valves like those of Lauracæ. The carpel is free and solitary; the fruit either a berry or capsule. The plants belonging to this order are herbs or shrubs, and are natives of the temperate regions of the northern hemisphere and of South America. The principal genera are *Berberis* (BARBERRY), and *Epinedium*; the latter connects the order with FUMARIACÆ. Their juice usually stains yellow, and their bark or stems, if not woody, are bitter and slightly astringent, on which accounts they are used in medicine.

BER'BERS, the name given by the Arabs to the original inhabitants of North Africa, which corresponds to the Libyans of Herodotus, who were the aborigines of the north, and by him distinguished from the Ethiopians to the south, and from the Greeks and Phœnicians who had settled on the northern coast. The Berbers of the Atlas range do not call themselves by that name, but employ the designation of *Amazirgh* or *Tanzirgh*.

The origin of the Berbers is uncertain, but is of great antiquity, and the race has maintained its identity, its habits, and its language, to the present day. It is now generally believed that the Berbers of Fez, the Shellooh of Morocco and Sus, the Showiah or Kabyles of Algeria, the Beni Mozab and other tribes of the Belad el Jerced south of the Atlas, the Zonaves of Tunis, the Adems of Ghadamis south of Tripoli, the Tuarics of the Great Desert, the inhabitants of the oases of Siwah, Audjelah, and probably of Fezzan also, are branches of one great parent stock—the Mazigh, or aboriginal white race of Northern Africa. Other African tribes have also been supposed by some writers to belong to the same stock.

In the empire of Morocco the aboriginal race is divided into two great sections, called by the Arabs Brebber (Berbers) in the north, and Shellooh in the south. The Berbers in the mountains live under tents, or in huts covered with mats, or in caves; but in the plains they have houses and villages, built generally of wood and clay covered with straw, and surrounded by a wall full of loopholes to fire through. They live chiefly on the produce of their cattle; they have great flocks of sheep, and also mules and donkeys, but few horses; and, unlike the Arabs, they travel and fight chiefly on foot. Some cultivate the ground, and they all rear bees. A great number of Jews live, and have lived from time immemorial, among them on a footing of social equality—a peculiarity which is not found among the Shellooh, or indeed among any other tribe in Africa, where the Jews are everywhere more or less despised and avoided or oppressed. Some writers suppose that the Berbers themselves followed the Jewish persuasion before the rise of the Saracen power. At present the Berbers in general profess, nominally at least, the religion of Islam. They have light complexions, and many have hair as fair as the northern Europeans; their beards are scanty and thin, differing in this from the other races who inhabit Morocco; they are remarkably well-proportioned, robust, active, lively, restless, and bold, and implacable in their revenge. Most of the Berber tribes live

in a state of almost total independence, under the administration of their omzargh, amrgur, and amucran—elders and lords who are hereditary. The Berbers dress in a woollen sleeveless jacket and trousers, with occasionally a blanket or a baracan over it. They shave the fore part of the head, leaving the hair behind hanging down to their shoulders; they wear short moustaches, and a small tuft of beard on the chin; they go mostly bareheaded and barefooted; they are good runners, swimmers, and huntsmen, and are very fond of their arms, which are often ornamented with ivory and silver at a considerable expense.

The Shellooh are smaller made and less robust than the northern Berbers, and they have darker complexions; they are more industrious, peaceful, civilized, and humane; they work at trades and manufactures; they are more husbandmen than shepherds; they live in houses called *tigmin*, made of stones and mortar, covered with roofs of bricks or slates; they have villages called *teddert* and towns called *murt*, surrounded by walls and towers. They have no Jews among them, and although some of their tribes live close to those of the Berbers, they keep separate from them and never intermarry with them. They and the Berbers do not understand each other's dialect without an interpreter, and whatever evidence there may be of a common origin, circumstances have since rendered them a very different people.

The Shellooh live in the western valleys of the Atlas, but they are more numerous south of the city of Morocco, especially in the provinces of Ihahha, Sus, and Guzzula. They occupy also the western offset of the Atlas, and compose the majority of the population in Sus. The Shellooh profess Islamism; they have inams and learned men of their nation; they have given sovereigns not only to Morocco, but to all North Africa and even to Spain. The founders of the dynasties of the Almoravides and Almohades were Shellooh.

BERBICE, the eastern division of British Guiana. It contains a population of 30,000, of whom only about 400 are whites. The river Berbice is the chief stream, and is navigable for upwards of 150 miles. The chief town is New Amsterdam, which is situated near the mouth of the river, and from which large quantities of rum, sugar, raw cotton, and timber are exported.

BERCHTA ("the Shining"), one of the Teutonic divinities, many of whose attributes are in common with those of Holda ("the Gracious Lady"), but who has the reputation of appearing to welcome the departing soul, as a tall woman in trailing white robes. In this character she is called "the White Lady." Berchta specially watches over souls unborn, and over those who die an early death; over children, and over spinning-maids and domestic workers generally. Sometimes she seems to personify Mother Earth. The name simply meaning "the shining one," it has been given apparently to several distinct deities in different districts. A profound veneration for Berchta and respect for her rare appearances still exists in the less civilized parts of Germany. Her name is sometimes spelt Berta, or even quite indefensibly Bertha.

BERCHTESGADEN, a romantic mountain district in the circle of the Isar, in the S.E. of Bavaria. It contains numerous delightful valleys, the most considerable of which lies along the Achen, which flows out of a lake nearly 8 miles in length, and traverses the centre of the district. The inhabitants find ample resources in the forests, meadows, gardens, and salt-mines. They are very skilful in manufacturing articles of wood, ivory, bone, &c. The government salt-works are situated on the Salzberg, at Frauenrout, east of the town of Berchtesgaden; they have been worked for 700 years. Fresh water is brought into the mine, and being acted upon by the rock-salt, becomes brine. It is then run off to a reservoir, whence by hydraulics means it is raised 1500 feet, and thence conducted to Traunstein and Rosenheim, about 40 miles inland, where

the salt is evaporated from the brine. **BERCHTESGADEN**, the principal town, lies close to the Austrian territory, at an elevation of 2018 feet above the level of the sea, and has a population of 1800. The population of the whole district is about 9000.

BERDIANSK, a town in the government of Taurida, Southern Russia, is a new and flourishing seaport at the mouth of the small river Berda, on the N. shore of the Sea of Azof, 150 miles N.E. of Simferopol, with a population of about 13,000. It has a good harbour between two peninsulas, with a lighthouse at the entrance; and in the vicinity are salt-lakes and coal-mines. The roadstead is the best in the Sea of Azof. More than 700,000 qrs. of wheat have been shipped from Berdiansk in one year; but the trade is declining owing to the want of railways and good roads from the interior, as well as lack of enterprise among the farmers and merchants. Barley, rapeseed, linseed, wool, and tallow are also exported; the import trade is insignificant. A college to accommodate 500 boys was erected in 1876. The town was spared by the allies during the Crimean war, but the government buildings were destroyed.

BERDITCHEFF, a town of Russian Poland, in the government of Kieff, 25 miles from Jitomir, is celebrated for its fairs, which are held five times yearly. At these cattle, corn, wine, &c., are offered for sale. The town is dirty and ill built. The population in 1883 was about 55,000—nearly all Jews.

BERE'ANS, a small Protestant sect, now almost extinct, known also as Barclayans, from their founder, the Rev. John Barclay, a Scotch minister (born 1734, died 1798). They took the former name in emulation of the people of Berea, commended in Acts xvii. 2 for their readiness to search the Scriptures in order to learn whether the teaching of the apostles was in accordance with them. Like the more modern "Bible Christians" and "Plymouth Brethren," they professed to derive all their doctrines directly from the Scriptures; and like the latter they were also Calvinistic in their theology. They denied that man could have any knowledge of the existence or attributes of God from nature or reason, but that all such knowledge was derived from the Bible. They interpreted the Psalms after a method of their own, insisted upon the doctrine of assurance, and declared that the unpardonable sin was that of unbelief.

BER'ENGER or **BERENGA'RIOUS**, one of the most learned divines of the eleventh century, was a native of Tours. Berenger, Lanfranc, and Anselm were the restorers of logic and metaphysical studies in Europe, with the assistance of Aristotle's works, which were about that time imported into France from the Arabian schools of Spain. Berenger was one of the first who employed logical reasoning in the study of the Scriptures, which had till then been interpreted according to tradition and the authority of the fathers. But his career is remarkable in connection with one of the great controversies that has divided the Christian world. Berenger maintained the doctrine of Scotus, that "the bread and wine used in the sacrament of the Eucharist were not transformed into the body and blood of Christ, but preserved their natural and essential qualities, and were only to be considered as external symbols of the body and blood of the Saviour." This had been already a subject of controversy in the Latin Church, but as yet no council had definitely decided upon the question. Pope Leo IX. procured the condemnation of Berenger's doctrine by the Councils of Rome and Verelli, 1049-50, and the book of Scotus was also committed to the flames. Council after council was assembled to protest against the doctrines advocated by Berenger, and during thirty years we find him sometimes defending his opinions and sometimes retracting them, under the influence of persuasion or threats. At length, in 1079, Berenger was induced to declare that bread and wine were, by the mysterious influence of the

words of the Redeemer, "substantially changed into the true, proper, and vivifying body and blood of Christ, not only in the qualities of external signs and sacramental representations, but in their essential properties and in substantial reality." This is the famous doctrine of transubstantiation.

After the last declaration of Berenger, Gregory VII. showed him great kindness and esteem, and allowed him to return to France; but Berenger once more retracted this his declaration of 1079. Lanfranc wrote against him, Berenger replied, and the controversy was carried on according to the scholastic method. Gregory VII. took no further notice of the dispute, nor of Berenger's retraction.

Fatigued and grieved with this long controversy, Berenger retired to St. Cosme, near Tours, where he spent the last years of his life in religious and ascetic exercises until 1088, when he died.

BERENICE, a name borne by several of the Macedonian queens of Egypt. (1) One of the four wives of Ptolemy I., the founder of the dynasty of the Lagidae in Egypt, and the mother of Ptolemy II., called Philadelphus. (2) A daughter of Ptolemy Philadelphus, and sister of Ptolemy Euergetes. She was given in marriage by her father (B.C. 252) to ANTIOCHUS II., king of Syria, called Theos, or God, who divorced his wife Laodice on the occasion. To avenge his sister, who met a swift death at the hands of Laodice, Ptolemy Euergetes invaded Syria, put to death Laodice, and overran the empire of the Seleucidae. (3) The wife of Ptolemy Euergetes. This Berenice is said to have made a vow of her hair during her husband's wars in Asia. The hair was placed in the temple of Venus, from which it was stolen, but Conon of Samos declared that it had been taken up to the skies and placed among the seven stars formerly in the lion's tail. (The reader, if he is curious, may find it in our *PLATE CONSTELLATIONS*, Northern Hemisphere, on the left hand, just within Virgo, and touching the equinoctial colure.) Berenice was put to death by her son Ptolemy Philopater. (4) Another Berenice, the only legitimate child of Ptolemy Soter II., reigned six months over Egypt, the last few days of their reign with her husband Alexander II., who, according to Appian and Porphyry, murdered her nineteen days after the marriage, B.C. 81. (5) Berenice, daughter of Ptolemy Auletes (B.C. 81), and sister of the famous Cleopatra. During the absence of her father at Rome, Berenice was intrusted with the regency, which office she held from about B.C. 58 to B.C. 55. Gabinius, about the close of B.C. 55, came to Egypt with an army and restored Auletes, who put his daughter to death. (6) A daughter of Herodes Agrippa I., grandson of Herod the Great (Acts xii.; Matt. ii.). This Berenice was the sister of Herodes Agrippa II., before whom Paul preached A.D. 63 (Acts xxv. 13). Titus fell in love with Berenice, who had taken an active part in favour of his father the Emperor Vespasian. After the capture of Jerusalem she came to Rome (A.D. 75), and Titus is said to have promised to marry her; but on becoming emperor he sent her from Rome, much against his will and hers, as he found that the proposed match was disagreeable to the people.

BERKEFORD, WILLIAM CARR, VISCOUNT, Field-marshal in the British army, was a natural son of George, first marquis of Waterford. He was born on 2nd October, 1768, and entered the army in 1785 as ensign in the 6th Foot. In 1793 he was sent to the Mediterranean, where he was present at the capture of Toulon, at the siege of Calvi, at Bastia, and at St. Fiorenzo. In 1795, having risen to the rank of colonel, he served in the West Indies under Sir Ralph Abercromby, and commanded a brigade in the army under Sir D. Baird in Egypt in 1799. In 1806 he bore a distinguished part in the reconquest of the Cape of Good Hope, and in 1807 assisted Admiral Hood in his descent upon Madeira, being named governor and commander-in-chief of that island. In 1808 he served in

Portugal, and proceeding with the army under Sir John Moore to Spain, was present at Corunna, where he was able to cover the embarkation of the troops. The following year he went back to Portugal to take command of the Portuguese army. At the head of 12,000 men he drove the French out of the north of Portugal, crossed the upper Douro, and joining his forces to those of Sir A. Wellesley, pursued the French army until it was entirely disorganized. He was made a Knight of the Bath for his eminent services at the battle of Busaco; and commanded at Albuera, defeating Marshal Soult, for which he received the thanks of Parliament. He was subsequently present at Badajoz, at Salamanca, where he was severely wounded; at Vittoria, the Pyrenees, Nivelle, at Nive, and at Orthes. He was in command of the British forces which took possession of Bordeaux, and subsequently bore a distinguished part in the battle of Toulouse. In May, 1814, he was elevated to the peerage as Lord Berkeford, and made a viscount in 1823. In 1814 he was employed by the Portuguese government to suppress a rising in Rio Janeiro. In 1822 he was appointed lieutenant-general of the ordnance, and in 1828 master general, resigning the latter office in 1830. He married in 1832, and lived in retirement until his death, 8th January, 1854.

BEREZOFF, a circle in the most northern part of the province of Tobolsk in Siberia. It lies E. of the Ural Mountains, is traversed by the Oby, and extends northward to the Polar Sea. The inhabitants are principally Ostiaks and Samoyedes, who live by fishing and hunting, and dwell in wretched hovels of wood and earth. A nomadic race, called Voguls, also inhabit Berezoff; these also live by hunting. Russians, chiefly Cossacks and exiles, make up the remainder of the inhabitants; these mostly reside in block-houses, and, where the climate permits, keep a few cows, sheep, and swine. Horses do not thrive; dogs are used as beasts of draught. The winter is long, commencing in August, and exceedingly severe. Snow lies for nine months in the year. Barley is grown in some districts. Pine is the chief timber produced, and of this there are immense forests.

BEREZOFF, the chief town of the circle, is built on the left bank of the Sosva, near the junction of that stream with the Oby. It is a small place 700 miles N. of Tobolsk, but important as a fur and trading station, and its annual fair is largely attended. The houses are built with planks of immense size, are entered in general from a lofty flight of steps, and connected by wooden walls with the "bányi," or baths, storehouses, &c., which are of inferior height and form a court-yard. It contains three churches and about 1500 inhabitants, mostly Cossacks and exiles.

Berezoff has a mournful interest attached to it, as a common place of exile for prisoners of rank, male and female. At this spot the sun just peeps above the horizon at the winter solstice, and a day of four hours alternates with a night of twenty, while the light prevailing through seven months of the year is that of the "half-dark days," as the Russians call the sombreness occasioned by clouds of mist, sleet, or snow-flakes in the atmosphere. Here, in 1727, when the place was a miserable group of log-houses, Prince Menzikoff, the powerful favourite of Peter I. and Catherine I., was deported. Becoming a devotee, the fallen minister helped with his own hands to erect a little wooden church now gone to decay. He went to the forest, axe on shoulder, to fell trees for the work, then served as bell-ringer in it, and was finally buried before the door of the building, having sunk in little more than two years under the shock of his political overthrow. His resting-place, not marked by any monument, but known through tradition, remained undisturbed till the year 1821, when the governor of Tobolsk had the grave opened. The coffin was found to be embedded in frozen soil; and owing to this circumstance, after the lapse of ninety-two years, its contents had undergone so

little change that pieces of the clothing which wrapped the body were sent to the descendants of the deceased as relics. The site of the wooden hut he occupied is still pointed out near the Spaska Church, the dwelling itself having been destroyed by a fire. A few years afterwards, Osterman and Dolgorouki, both the colleagues of Menzikoff, were banished to the same place, and both, like him, ended their days at it. It has been said that the flower of the Russian court and army lie buried beneath the snows of Berezhoff.

BERG, a root-word of Teutonic origin, which in its modern forms of "burg," "burgh," and "borough," forms a part of the name of numerous towns and places in Great Britain. It originally signified a hill, and still retains this meaning in German, Dutch, and Swedish, but from the custom of using hills as strong places it acquired a secondary meaning, and implied a fort, castle, walled city, &c.

BERG, formerly a duchy in the W. of Germany, bounded N. by the duchy of Cleves, E. by the duchy of Westphalia, S. by the Westerwald, and W. by the Rhine. That portion of the duchy which lies towards the Rhine is level and productive, but the eastern parts of it are covered with forests and hills. It does not yield grain, or support cattle enough for the use of the population, which is very dense; but it abounds in copper, lead, quicksilver, and particularly iron, and contains numerous iron, steel, linen, cotton, woollen and soap manufactories. The duchy was ceded to France by Bavaria in 1806, and Napoleon enlarged it and conferred it first on Murat, and then on the crown prince of Holland. At the congress of Vienna, in 1815, it was given to Prussia, and is now included in the Prussian Rhein-Provinz.

BERGAMA (the ancient *Pergamos*), a town of Asiatic Turkey, in the pashalic of Anatolia, about 40 miles N.E. of Smyrna. The population is about 10,000. There are many splendid remains of its former greatness in the shape of temples, palaces, amphitheatres, aqueducts, &c.

BERGAMO, a province of Italy, is bounded E. by Tyrol and Brescia, S. by Cremona, W. by Milan and Como, and N. by Sondrio. The province is very mountainous, lying on the southern slope of the Alps, the lower heights of which consist of woodlands and pastures. The wood is chiefly larch, fir, oak, birch, and chestnut. The herdsmen, with their families and cattle, ascend the Alps during the summer, and descend gradually, as the winter approaches, to the valleys. The lower slopes are formed into terraces, and cultivated with great labour. Honey and wax are gathered. Among the numerous rivers the principal are the Brembo and the Serio, feeders of the Adia, and the Oglio, which falls into the Lago Iseo. The valleys of these rivers are very fertile, and the system of irrigation is extensively applied. The vine, the olive, and the walnut are cultivated, flax is grown; and there are large plantations of mulberry-trees for raising silk, which constitute the chief wealth of the province. Marble is abundant, and there are also valuable iron-mines, large iron-works, and several woollen and silk factories. The province is celebrated for its beautiful scenery. The inhabitants speak a peculiar dialect, in which the harlequin of the Italian stage is usually made to express himself. The population in 1882 was 391,010.

BERGAMO (the ancient *Bergomum*), the capital of the province, stands between the Brembo and the Serio, 32 miles N.E. of Milan. The town consists of two distinct parts—the old and the new. The old town (Citta) is beautifully situated on several hills, and contains many interesting houses of the early and late Renaissance. From the castle at the summit of a hill to the N.W. there is a very fine prospect. The new town is chiefly devoted to woollen, silk, iron, and other manufactures, and lies in the plain. Among the churches the most remarkable are the cathedral, those of Santa Maria Maggiore, Santa Grata, St. Thomas, St. Alexander, and St. Augustine, all of which are decorated with paintings and gilding. Other

important buildings are the Broglio or town-hall, near which is a fine statue of Tasso, whose father was a native of Bergamo; and La Fiera, in which a fair is held in the latter end of August and beginning of September every year. The fair has been held for 900 years, and was once very celebrated, and transactions to the extent of £1,000,000 often took place at it annually, but it has now lost its importance. Bergamo is, however, one of the busiest of the smaller trading and manufacturing towns of Italy. A large number of grindstones, made in the neighbourhood, are sent to all parts of the country. Bergamo is the seat of a bishop. It possesses a public library of 45,000 volumes, a lyceum, and several schools. In the Carrara Academy, which was founded by Count Giacomo Carrara, lectures are given on painting and architecture; in connection with it there are collections of paintings, medallions, casts, &c. The population in 1882 was 39,704.

Bergamo is very ancient, having existed under the Romans. In 1428 the inhabitants placed themselves under the protection of the republic of Venice, of which it continued to form an integral part till the submersion of the latter in 1796, with the exception of about seven years after the battle of Agnadello, in 1509, when it was taken by Louis XII. During the French ascendancy it was the capital of the department of Serio. The town fell to Austria in 1815, but in consequence of the events of 1860 was incorporated with the new kingdom of Italy.

Bergamo has given birth to some very eminent men, among others to Bernardo Tasso, the father of Torquato (a colossal statue has been erected in the Piazza Grande in honour of the latter); Tiraboschi, the author of the learned, elaborate, and valuable work on the history of Italian literature, "*Storia della Letteratura Italiana*;" and to the Abbe Scerassi, author of the "*Life of Tasso*."

BERGAMOT. See CITRUS.

BERGAMOT ORANGE (*Citrus Bergamia*) is a shrub or small tree with little white perfumed flowers, and a pale-yellow, pear-shaped fruit. By Sir J. Hooker it is considered to be a cultivated variety of the common orange, but it is easily recognized by the peculiar fragrance of its small flowers. From both flowers and fruits the perfume procures an essence of a delicious quality. The bergamot is cultivated to a great extent near Reggio in Calabria. The Mellarosa of the Italians is a variety with ribbed fruit, having a broad sear at the summit; it is much esteemed on account of the abundance of its flowers.

The essence of bergamot is an essential oil, obtained both by pressure and distillation; it is limpid, yellowish, and fluid. The kind procured by pressure is not so fluid as that yielded by distillation, but its odour is more agreeable. The specific gravity of essence of bergamot is 0.888; its smell resembles that of oranges, and it is used as perfume. *Mentha citrata* furnishes an oil with a sweet odour, much like the oil of bergamot. See CITRUS, MENTHA.

BERGEN, a town in the kingdom of Norway and province of South Bergen, is situated in 60° 23' N. lat., and 5° 20' E. lon. At an early period, attracted by the prolific fisheries on the coast, and particularly by the herring fishery, a number of fishermen were induced to settle round a gulf of the North Sea, on a part of which the town is now built. Its convenient situation for trade induced one of the ancient kings of Norway, Olaf Kyrre, to enlarge the place and to build a regular town there in 1069. The population in 1875 was 33,830.

The island, called Asköen, situated about 3 English miles from the town, forms a bulwark against the sea, and incloses the large bay Byfjorden, which, forming two branches, called Vaagen and Puddefjorden, encircles the town. The town is built on a promontory, and extends round that part of the bay called Vaagen, which constitutes the real harbour. On the east side are two lakes, Lille and Storo Lungegaards Vandet, communicating with the Puddefjord, so that the

town is almost entirely surrounded by water, and only joins the mainland on the N.E. It is inclosed by high mountains.

During the twelfth and thirteenth centuries, for a period of about 130 years, Bergen was a sort of residence for the ancient kings of Norway—a circumstance which greatly contributed to its prosperity. Trade was carried on partly with Nordlandne, partly with the islands of Faerø, the Orkneys, Iceland, and Greenland. In the year 1278, the German merchants of the Hanse Towns obtained permission to settle in and trade with Bergen, by whom the English and Scotch were gradually displaced, and at last entirely expelled in the year 1312. The Hanse merchants' privileges were confirmed and extended, in 1343, by King Magnus Smek. From this date they acquired a complete ascendancy in the town, supplanted the inhabitants in every branch of commerce, and usurped an almost despotic dominion over the townsmen for more than a century and a half. The oppressed citizens frequently presented their complaints to the government, but their wrongs were not redressed until Frederick II. of Denmark, on the 20th of July, 1560, issued an act, called *Odense Recess*, which placed more definite limits to the privileges of the Hansatics, and became a law, according to which the quarrels between the Hansatic and the citizens were decided. From this period the usurped authority of the Hansatics was at an end. Other nations, English, French, Spanish, began to trade with Bergen, in which the citizens themselves also partook.

Bergen has been several times visited by great calamities. In the years 1348 and 1350 the black pestilence, which was brought thither by an English vessel, carried off the greater part of the population. At other different dates, in the years 1618, 1629, and 1637, the plague destroyed about 3000 of the inhabitants each time. It has also frequently suffered by fires, of which the most destructive happened on the 19th May, 1702, whereby nearly the whole town was reduced to ashes. Much of the older part of the town was burned down in 1855, and has been rebuilt in a handsome modern style; but the other quarters consist of closely built wooden houses painted white.

The trade of Bergen may be divided into two branches—the internal and the foreign. Of the first, that with the northern provinces of Norway, called Nordlandne, is the most important. These provinces receive from Bergen the greater part both of the necessaries and the luxuries of life. In return, Bergen receives from them large quantities of fish, herring, fish-oil, catfish, &c., all which articles are brought by the Nordlandmen themselves in their own vessels to Bergen. These vessels still retain the shape of the ancient dragon ships of the Vikings. The foreign trade consists chiefly in the exports of these articles to various countries, and in the imports of brandy, wine, corn, cotton, woollens, coffee, and sugar. The town has a considerable mercantile fleet of both sailing vessels and steamers, as well as the largest shipbuilding establishment in Norway.

Bergen is the residence of the high sheriff (*stiftamtmandt*) and the bishop of the diocese. It is likewise the seat of a tribunal of second instance (*stifts over-ret*). There are in the town a cathedral, several other churches and schools, a museum, libraries, hospitals, poorhouses, national bank, savings bank, and other public institutions. There are also tobacco manufactories, distilleries, and rope-yards. The new market-place is a handsome square planted with trees, and is surrounded with fine buildings. The town is strongly fortified. Bergen is the most considerable commercial town in Norway next to Christiania. The inhabitants are in general laborious and industrious, their attention being particularly directed to their trading pursuits. They are more vivacious than those of other parts of Norway, and are noted for their sociability and light-heartedness. Most of the better educated of the inhabitants speak English or German, or both languages.

The climate of Bergen is in general humid and rainy, but not unwholesome; the winter is seldom so severe as to freeze the harbour. Much attention is paid to orchards in the surrounding districts, and there is a greater abundance of fruit here than in any part of Norway.

BER'GEN-OP-ZOOM, a town of Holland, in the province of North Brabant, is situated on both sides of the Zoom, and near the right bank of the eastern channel of the Schelde. It has a good harbour and 10,000 inhabitants, many of whom are engaged in tile-works and potteries of fine ware. There is also a trade in anchovies caught in the Schelde. The houses are well built, and the squares are handsome and spacious. The town was formerly very strongly defended, but the fortifications were dismantled in 1867. Bergen was one of the first towns occupied by the States general. In 1622 it stood a memorable siege by the Spaniards, who were compelled to retire, after losing 10,000 men. In 1747 it was taken by the French by stratagem. In 1814 it was nearly taken by the British by a *coup de main*, but they were finally repulsed with considerable loss.

BERGERAC, the chief town of an *arrondissement* of the same name in the department of Dordogne, France, is situated in a fertile plain on the right bank of the Dordogne, 26 miles S.W. from Périgueux, and had 13,000 inhabitants in 1883. It is ill built, but there are some good houses in the market-square and near the bridge across the Dordogne. This bridge, which consists of five arches, the theatre, and the public library, are the most remarkable objects in the town, which has also tribunals of first instance and of commerce, and a college. There are several iron-foundries and smelting furnaces, and some manufactures of paper, hats, hosiery, and leather. The wines of the neighbourhood are in good repute.

BERHAMPUR, a municipal town and military station in the Berhampur *taluk*, Ganjam district, Madras, is situated on the great Trunk Road, 52½ miles N.E. from Madras, 18 S.W. of Ganjam, and 19 from Chhetterpur (Chattrapuri), and connected by a good road with Gopalpur, the port of Berhampur on the coast. Being the headquarters of the district, Berhampur possesses all the public buildings and establishments of a station of first-class importance. A considerable trade is conducted in sugar and silk cloth, manufactured from Chinese and Bengal cocoons. The population is 22,000.

BERHAMPUR, a large municipal town, and the administrative headquarters of Murshidabad district, Bengal, is situated on the left bank of the Bhagirathi, 5 miles below the city of Murshidabad. It was first selected as a site for military barracks in 1757, shortly after the battle of Plassey, the factory at Kasimbazar having been destroyed by Suraj-ud-daula, and the fortifications dismantled in the previous year. A *sauad* (grant) was obtained from Mir Jafar for 183 acres of ground; but the court of directors disallowed the project, and it was not until 1765 that the present barracks were commenced—the immediate object of their construction being to secure Bengal against such another occurrence as the revolt of Mir Kasim in 1763. The barracks were completed in 1767, costing £300,000. They still form the most prominent feature of the town, though of late years they have been rarely occupied by European troops, and are now to a great extent appropriated to other uses. The cantonment will always be remembered as the scene of the first overt act of mutiny of 1857. The Sepoys of the 19th Native Infantry, who had been intensely excited by the story of the "greased" cartridges [see SEPOY MUTINY], rose on the night of the 25th February in open mutiny, but were prevented from doing any actual harm by the firm and at the same time conciliatory behaviour of their commanding officer, Colonel Mitchell. There are several churches in the town, and the cemetery contains some interesting memorial stones.

BERKELEY, a market-town in Gloucestershire, 16 miles S.S.W. from Gloucester, is situated on the north bank of the Little Avon, which falls into the Severn a mile and a half from the town. The town is pleasantly situated on a gentle eminence, and consists of four streets diverging from the market-place. The church is a large and handsome Gothic structure, in the pointed style, with a modern bell tower at some distance. It is the burial-place of Dr. Jenner. There is a town-hall, grammar-school, and market house. The town is on the Midland Railway, and has a trade in timber, coal, malt, and cheese, which is facilitated by the Gloucester and Berkeley canal. Berkeley Vale is noted for its rich pastures, and produces the famous "double Gloucester" cheese. On the south side of the town is Berkeley Castle, where Edward II. was murdered in 1327. It is an irregular pile, consisting of a keep and other buildings, all in a perfect state of repair, surrounding a court about 140 yards in circumference. Of the buildings which surrounded the outer court, not one remains except the entrance gateway. A portion of the ditch, now dry, yet exists, and is still to be seen on the north side of the castle. The population of the town in 1881 was 870.

BERKELEY, BISHOP GEORGE, was born at Kilkenny, near Thomastown, in the county of Kilkenny, 12th March, 1684. He received his early education at Kilkenny school, was admitted a pensioner of Trinity College, Dublin, at the age of fifteen, and became a fellow on the 9th of June, 1707. In the same year he published his first work, "Arithmetica abque Algebra aut Euclidæ demonstrationibus." His next work, published in 1709, was "The Theory of Vision," and in the following year "The Principles of Human Knowledge" appeared. He left Ireland in 1713 and went to London, where he was introduced to Steele, Swift, Pope, and other persons of distinction. In London he published his "Dialogues between Hylas and Philonous," and wrote several papers in the *Guardian*. Berkeley was recommended by Swift to the Earl of Peterborough, with whom he set out as chaplain and secretary in November, 1713, on his embassy to Sicily. He then accompanied the son of the Bishop of Clogher on a tour through Europe, which occupied more than four years. He next became chaplain to the Duke of Grafton, lord lieutenant of Ireland.

When in London he had been introduced by Swift to Miss Vanhomrigh (Swift's *Vanessa*), and when this lady discovered (as she believed) the marriage between Swift and her rival Stella she altered her will, and left the £8000 which she intended for Swift, to Mr. Marshall and Dr. Berkeley, her executors. Berkeley did not, however, publish her correspondence with Swift, though she left this injunction in her will, but committed the letters to the flames.

In 1721 Dr. Berkeley was made dean of Derry, a place worth £1100 a year, and he resigned his fellowship in consequence. From the time of his return from the Continent he had occupied himself with a scheme for the conversion of the North American savages by means of a missionary college to be erected in the Bermudas. He published his plan in London in 1725, and offered to resign his preferment and dedicate his life to this benevolent project on an income of £100 a year. He obtained a charter for his college and a promise of £20,000 from the minister, resisted the temptation of an English mitre offered him by Queen Caroline, and though he married in August, 1728, Anne, eldest daughter of Mr. Forster, the speaker of the Irish House of Commons, he was not to be turned from his purpose, but sailed in the middle of the ensuing month for Rhode Island, with his wife, another lady, two gentlemen, a valuable library of books, and a large sum of his own property. He took up his residence at Newport, in Rhode Island, and for nearly two years devoted himself indefatigably to his pastoral labours. The government,

however, disappointed him, and he was compelled to return to England, having spent the greater part of his fortune in vain. In 1732 he published his "Minute Philosopher," a series of dialogues on the model of Plato. He was promoted in 1734 to the bishopric of Cloyne, and entered upon the exemplary discharge of all his episcopal duties. Here he wrote the "Analyst," a work addressed "to an infidel mathematician." Having received benefit from the use of tar-water when ill with the colic, he published in 1744 "Siris," a work on the virtues of tar-water, on which he said he had bestowed more pains than on any other of his productions. When Lord Chesterfield, in 1745, offered him the see of Clogher, worth twice as much as the one he held, he refused it because he had already enough to satisfy his wishes. His "Maxims concerning Patriotism" appeared in 1750. His last work was "Further Thoughts on Tar-Water," published in 1752, when he removed to Oxford in order to superintend the education of his son. He died, rather suddenly, early in the following year.

Bishop Berkeley in person was stout and well made, his face was benignant and expressive, and his manners elegant. The information with which his mind was stored embraced not merely professional and philosophical learning, but trade, agriculture, and the common arts of life. He was universally beloved. Adverse factions and wits concurred in ascribing, with Pope, usually so bitter a satirist—

"To Berkeley every virtue under heaven."

Berkeley's "New Theory of Vision" has been justly said to have made a new epoch in science; and indeed it has been left to our own day and to the famous Professor Helmholtz ("Optics," 1867) to develop the wonderful perspicacity of this theory in all its fulness. Its main feature is the upsetting of the formerly universal notion that we perceive distances, &c., by the eye through *instinct*, whereas Berkeley shows that *experience*, and especially the experience of touch, has to be called in to train the eye to this perception. The greater knowledge of our later times has added arguments for Berkeley, with which the imperfect science of his day could not furnish him; and the muscular feeling of tension as the eyes converge or diverge, or turn to right or left, the varying size of the object in the eyes according as it is nearer the right eye than the left, or *vice versa*, are now all clearly seen to co-operate with the sensation of touch (by the outstretched hand, &c.), in enabling the eye to acquire its necessary experience. The child cries for the moon, the lowlander thinks to reach the mountain top in a few minutes, and numberless other common proofs abound of the accuracy of the philosopher's view.

On the other hand, such things as the fact that chickens peck with good aim almost as soon as they are hatched (so that Sir Joseph Banks records having seen a chicken catch at a fly whilst the shell yet stuck on its tail) tell against Berkeley so far as animals are concerned. But (1) we have as yet no adequate body of observations on this point; and (2) the extent to which acquired powers may be transmitted to posterity ("hereditary") is as yet unknown.

Berkeley's "Principles of Human Knowledge" equally made an epoch in metaphysics. Abandoning the old theory of abstract ideas, he simply, with trained common sense, observed the facts, and arrived at the fruitful conception of what is known as *idealism*. That is, he says, our *idea* of a tree is a fact in itself, which has no existence apart from the mind wherein it exists. Dr. Johnson kicked a stone, and was held to have triumphantly refuted the philosopher; and when so great a man as Johnson condescended to such folly, no one can wonder that Reid and his like advised the great scholar to "run his head against a post," mistaking their ignorance for wit (see Reid's "Inquiry," &c.) For Berkeley had not said that *posts* did not exist outside us; he said that our *idea of a post* was something peculiar to our mind; that, namely, there was not, as was usually

asserted, and held even by Locke himself, a sort of phantom post beneath the apparent one. Yet even to our own day the "coxcombs vanquish Berkeley with a grin," as was crushingly said of them in Berkeley's own time by Brown (essay in Satire), in a line almost universally ascribed to Pope.

Idealism is indeed strict moon sense applied to the observation of mental phenomena; and as such marks the beginning of true mental science as clearly as Bacon's "Method of Induction" marks the dawn of accurate physical knowledge. Berkeley says, if by matter you mean what we see and touch, I agree with you that matter exists; but if you say that matter is something unseen, whereof we only can discern the outer properties, then I deny its unprovable existence. "I differ from the philosophers and agree with the vulgar." In his "Dialogues" he makes Philonous say, "We both agree in this that we perceive only sensible forms; but herein we differ—you will have them to be empty appearances, I real beings. In short, you do not trust your senses; I do." Schoolists are misled by the use of the word "matter." When Berkeley denies the existence of *matter*, I do not deny the

of the seen, touched, tasted, &c., whereas in truth he denies the existence of the *not* seen, *not* touched, *not* tasted—the curious philosophical "substantium" imagined by learned men to exist beneath appearances. Locke would say, you see the semblance of a post, but to other animals it may show a different appearance, yet beneath all views there is the post, there is a something ("matter") over and above what can be seen or felt. Berkeley would reply, what *I* see is the post to me, and I believe there is nothing beyond it.

It is unfortunate that the word *matter* affords so much ambiguity between its philosophical and natural senses; and it is no less unfortunate that the word *idea* is used, and necessarily used, by Berkeley to express both a *sensa* (a material object) and an *idea* (a mental conception) in the natural meaning of the word. These two confusions of language probably are at the root of the misapprehension of his views. To the old metaphysical division of the universe into *mind* and *matter* Berkeley opposes his theory, which admits of no existence but mind; and, as we have attempted to show, he cannot be overthrown by facts. Reid and the Realists generally rely, however, on the universal irresistible belief (which they utterly fail in proving) that the world exists, and would exist even if there were no mind to perceive it. Berkeley fails only in one point, but this is most vital. He says, quite rightly, that you cannot *prove* the existence of anything unperceived by mind (for if you imagine, for example, a grove of trees with no one by to see it, it exists already in your imagination); but he goes too far in saying, "therefore *nothing exists* beyond the perceived." To assert this is to assert the absoluteness of knowledge; and nothing is now better ascertained than that all knowledge is *relative*. This last statement simply amounts to the assertion, which no one can deny, that we can only view things according to our nature and not otherwise; what they seem to other beings we know not. All knowledge is *relative* to the knower. An excellent account of Berkeley's life and philosophy, by Professor Fraser, was published in Edinburgh in 1881.

BERKHAMPTSTEAD, a town in Hertfordshire, 28 miles from London by the North-western Railway, and about 18 from Hertford. The town is situated in a deep vale on the S.W. side of the Bulbourn and the Grand Junction canals, which here run in a line together, parallel with the highroad. It has a considerable trade in timber, malt, and coals, which is assisted by the navigation of the canal. The town is well built, mostly of brick, and has a very respectable appearance. It was called by the Romans *Durobrivæ*, and became a place of some eminence under the Saxons. It was here that the prelates and

nobles obtained from William the Conqueror an oath that he would govern according to the laws of Edward the Confessor. William conferred the castle and manor on his half-brother, the Earl of Mortton. Edward III. bestowed the property on his son, the Black Prince, when he created him Duke of Cornwall, and it has since been held by the Princes of Wales. A few fragments of the castle wall still remain on an eminence outside the town. Cowper, the poet, was born here—his father being rector of the parish. A stained-glass memorial window to him was placed in the chancel of the church in 1872. The church is a large Gothic structure of considerable beauty, containing numerous interesting monuments. It was thoroughly restored in 1871, at a cost of upwards of £10,000. There are also places of worship for all denominations of dissenters. Among the schools in the town is a fine grammar-school, founded in the reign of Henry VIII. It has recently been improved and enriched by the establishment of several exhibitions. The town also contains a handsome market-house and corn exchange, and large assembly rooms. New water-works were opened in 1866. Straw-plaiting is extensively carried on, and large numbers of articles are also made—including all the tent pegs for the army, bows, cricket bats, hoops, toys, &c. There are also large chemical works, and a very busy in the immediate vicinity. The population in 1881 was 4485.

BERKSHIRE, an English county in the midland district, included within the basin of the Thames, which in its course from the neighbourhood of Lechlade in Gloucestershire to below Windsor, the boundary N. and E. of the county, and separates it from the counties of Gloucester, Oxford, and Buckinghamshire, which lie on the other side of the river. On the W. it is bounded by Wiltshire, S. by Hampshire, and S.E. by Surrey. The length from east to west is about 43 miles, and the breadth from north to south 31. The area is about 740 square or 450,132 acres. In 1881 there were 43,126 inhabited and 2113 uninhabited houses in the county. The population consisted of 218,363 persons of both sexes, as against 196,475 in 1871—being an increase of 21,907. In 1851 the number of inhabitants was only 170,065.

Surface, Rivers, Canals, and Railways.—The principal high land in this county consists of a range of downs running W. by N. or W.N.W. from the banks of the Thames between Reading and Wallingford, into the northern part of Wiltshire. These hills, which, with the Marlborough Downs in Wiltshire and the Chilterns of Buckinghamshire, form one chalky range, rise in some parts to a height of nearly 900 feet. The northern declivity is steeper and brier than the southern, which descends gently to the river Kennet. The east end of the range has some arable land, while the west end is used for sheepwalks. The rivers from the northern slope flow into the Thames; and those from the southern into the Kennet. There is a similar range of hills skirting the Thames; and between the two ranges is the Vale of White Horse. The south and east sides of the county have large woodlands of hazel, oak, ash, beech, and alder. The whole of the south part of the county was once occupied by the Forest of Windsor, which extended in one direction into Buckinghamshire, and in another into Surrey as far as Chertsey, Cobham, and even Guildford, and reached westward as far as Hungerford along the vale of the Kennet. It was disforested in 1226, and much of it is now under cultivation. A great part of Bagshot Heath was within the boundaries of the forest. The principal river of Berkshire is the Thames, which, however, is not in any part included within the county, but forms its northern border. Its course past the county exceeds 100 miles. The navigation of the stream commences near Lechlade, but is tedious and uncertain, especially for large boats. The

Kennet, which rises in Wiltshire, enters the county near Hungerford, and runs eastward to Newbury, below which it receives the Lambourn, which rises in the chalk hills above the town of Lambourn. The Kennet then continues its course towards Reading, and falls into the Thames a little below that town. The Kennet flows about 30 miles in Berkshire, and the Lambourn 15. The Loddon rises in Hampshire, and flows through Berks about 12 miles to its junction with the Thames between Reading and Henley. The Oak rises in the west part of the county, and flows about 20 miles to the Thames at Abingdon. The Auburn rises in the S.W. of the county, flows about 18 miles, and falls into the Kennet. All the other streams are small.

Besides the navigation of the Thames and the Kennet, Berkshire has two canals, viz. the Wilts and Berks Canal, and the Kennet and Avon Canal. The former commences in the river Thames just below Abingdon, and is carried through the Vale of White Horse past Wantage into Wiltshire, crossing that county near Swindon, Wootton Bassett, Calne, Chippenham, and Melksham. It joins the Kennet and Avon Canal not far from the last-mentioned town. The Kennet and Avon Canal commences at Newbury, forming a continuation of the river Kennet navigation, and passes up the Vale of Kennet by Hungerford and Great Bedwin to Crofton, Devizes, Semington, Trowbridge, Bradford, and Bath. A little way above Hungerford the canal is crossed over the Kennet by an aqueduct of three arches.

The principal roads which pass through Berkshire those from London to Bath and Oxford. Both these enter the county at Maidenhead, a little beyond which they separate, the Oxford road running nearly due west to Henley, on entering which it leaves the county, and the Bath road running south-west to Reading. There are two other roads from London to Reading, both of which pass through Egham in Surrey, and separating there, run nearly parallel to each other, until they reunite a few miles before they reach Reading. From this town the Bath road passes through Newbury and Hungerford, just after which it enters Wiltshire. There are several other main roads crossing the county in different directions. These roads are good, as are also the private roads in the south-eastern part, especially about Reading.

The chief railway in the county is the Great Western. Entering at Maidenhead it passes Twyford, Reading, Wallingford Road, Didcot, and Stevenage. From Didcot a branch line runs to Oxford and Birmingham. Several branch lines run from Reading; one to Basingstoke, on the South-western line, another to Guildford and Reigate, on the South-eastern and Brighton Railroads. Windsor is connected by branches with the Great Western and South-western lines.

Climate, Soil, Agriculture.—The climate of Berkshire is one of the most healthy in England. The chalky hills in the western part of the county are remarkable for the invigorating and bracing qualities of the air. The vales being milder may perhaps suit delicate constitutions better, and having pure streams running through them, which make the air circulate and purify it, they are considered as healthy as the hills. Fevers and all kinds of epidemic diseases are very rare.

The soil, as may be expected in a county of such extent and so irregular a shape, is extremely varied. The principal hills are composed of chalk; the valleys of different kinds of loam, in which clay predominates, with gravel and sand upon it rising into small elevations. Along the rivers are alluvial deposits. The whole county seems to lie over chalk or limestone. Windsor Castle, at one extremity, stands on a solitary mass of chalk surrounded by a stiff clay. This clay in some places has a depth of 300 feet over the chalk. The chalk rises to the surface near Maidenhead and Marlow. The clay of the forest is a compact blue, of the same nature as that which is usually

called the London clay, and in which nearly the whole bed of the Thames lies, from near Reading to the sea.

Over this clay lies the poor sand and loam impregnated with iron, known by the name of Bagshot Heath sand, which extends into Hampshire and Surrey; and also the richer alluvial soils in the valleys, and along the banks of the Thames and the Kennet. Under the Vale of White Horse, where the richest soils occur, the chalk runs into a harder limestone of a blue colour, and a freestone or oolite, which composes the Cotswold Hills in Gloucestershire. In the Vale of White Horse one of the most fertile lands in England. The western part of the vale is chiefly covered with rich pastures, and is covered with a sound and dry subsoil. Along the bottom of the White Horse Hills lies the rich corn land for which the vale is celebrated, intermixed with gravel and sandy loams of an inferior quality, and some very stiff clays. Along the Thames belt of rich meadows, extending in some places only to a very short distance from the river, and nowhere above 2 miles. The next district in importance, in an agricultural point of view, is the Vale of Kennet; its soil is well adapted for the growth of corn, and the inferiority in natural fertility is compensated by superior care in the cultivation. The markets of Newbury and Reading not only supply the less fertile district with corn, but likewise give employment to numerous mills, whence the grain, in the shape of flour, is sent in considerable quantities to the London market. The soil in this vale is chiefly gravelly, covered with a layer of 1 or less depth of loam, some of which is of a reddish colour, and may vie in fertility with the white land in the Vale of White Horse. On the south of the Kennet are some compact clays, in which oaks thrive, and where good crops of wheat and beans are raised with careful culture. South of Newbury, towards the boundary of the county, the soil becomes less productive, till it assumes the character of the brown heath, which indicates the barren ferruginous sand of Bagshot.

Along the river Kennet, from Hungerford to Reading, there is a valuable tract of water meadows, which produce much herbage, sometimes made into hay, and at others depastured with sheep and cattle. Under the meadows, along part of the Kennet near Newbury, there is a species of peat, which is extensively reduced to ashes by burning, and applied as a top-dressing to clover and artificial grasses. Between the Vale of White Horse and that of the Kennet extends a district of inferior land, partly consisting of chalky hills covered with sheep-walks, and of dales of moderate fertility. The soil is principally calcareous, with variations of clay and gravel.

The eastern part of the county, or the Windsor Forest district, though less fertile than the western, is not less inviting as to situation. The hills from Egham to Bray are covered with very fine old and young plantations, and form the picturesque scenery of Windsor Great Park. This open uninclosed forest formerly amounted to about 21,000 acres, and much of it remains in its original state, although divided and inclosed. The allotments given to the crown, amounting to about one fourth of the whole, have been mostly planted with trees, where they were not already in woods. The soil in the forest district is extremely varied; along the Thames there are excellent meadows, and some very good arable land. To the south, along the hills, which extend at the distance of 2 or 3 miles from the river, the surface is a very tenacious clay, better adapted for grass than for corn.

The number of rich proprietors in Berkshire who hold land to some extent in their own hands is considerable. They employ intelligent bailiffs, and improved modes of cultivation are readily tried by them. The most perfect machines and implements may be found on their farms, and everything new finds some person ready to give it a trial. The influence of this has been very widely felt, and

the farmers have readily adopted any improvements that seemed to them of a practical character. The farms are generally large, and being worked with sufficient capital, improvements can be carried out under favourable conditions, and the best system of cultivation has always been found to be the most profitable. Drainage is now general throughout the county, and a good rotation of crops has been introduced. It varies from a five years' course S. and S.E. of Reading, to a three or four years' rotation in the Vale of White Horse. According to the official agricultural statistics published in 1882, there were 377,000 acres under cultivation, of which 137,000 were devoted to corn, 55,000 to green crops, 40,000 to clover and other artificial grasses, and 130,000 were in permanent pasture. The live stock in the county at the same time consisted of 35,000 cattle, 230,000 sheep, and 33,000 pigs.

The *uldar* or *attle* of Berkshire, and those generally met with are imported from Devonshire, Herefordshire, and Yorkshire. The Glamorganshire and Alderney cows have also been introduced. Double Gloucester and other cheese are sent to London in large quantities. Fat cattle are also forwarded to the metropolitan markets; and in the eastern part of the county a good many calves are reared. Cart horses are bred in the county; and Northamptonshire colts, after being worked two or three years on the Berkshire farms, are often sent to London to be used as dray horses. The breed of pigs is one of the best in England. They are not of a very large size, although many fattened at two years old weigh 100 lbs. when killed, and some even more; the bone is small, and they fatten at an early age and on little food. The true Berkshire breed is black with white spots, but some are quite white; their snouts are short, jaws thick, and their ears stand up. A mixed breed, produced by crossing the Berkshire with the Neapolitan breeds, possesses improved qualities. The Berkshire sheep called the *Not* was a large polled sheep with coarse wool, useful for the fold on cold clay soils, but coarse in the carcass. It is now almost superseded by an improved breed produced by crosses from the old sheep and the Leicesters, and by the South Down, which are now the favourite breeds. Some of the Cotswold sheep, crossed with the Leicester, produce a large sheep, which gets very fat, and carries a heavy fleece of long wool.

Near Reading there are considerable garden grounds, the soil being deep and good, and the produce coming earlier to maturity than in any other part of the county. The onions, and especially the asparagus of Reading, are remarkably fine, and in great demand in the season. Orchards are not very numerous. The apples which grow in the vale are mostly sent to London. About Wantage are some cherry orchards, the produce of which is great in good years, but it is a very precarious crop. Woods and coppices are scattered over the county, and add to the diversity. The coppices are in general very valuable as commercial produce. The osier-beds on the banks of the Thames are also very productive to their owners.

Berkshire being essentially an agricultural county, there are scarcely any manufactures of importance, except those that are incident to that occupation—such as agricultural implements, artificial manures, &c. The only exceptions are the extensive biscuit manufactory of Huntley & Palmer at Reading, and some paper-mills at Newbury.

Divisions for Ecclesiastical and Legal Purposes.—Berkshire is divided into twenty hundreds. The number of parishes is about 150, several of which are partly in other counties. The county is almost wholly in the diocese of Oxford, and forms an archdeaconry, which is subdivided into four rural deaneries—namely, Abingdon, Newbury, Reading, and Wallingford. Reading is the assize town. Eight members are returned to Parliament—three for Berkshire, two for Reading, and one each for Windsor,

Abingdon, and Wallingford. The total number of voters on the county register in 1884 was 8100.

Civil History and Antiquities.—In the division made by the Romans of that part of the island which they reduced to subjection, Berkshire appears to have been included in *Britannia Prima*. Of this remote period Berkshire retains some memorials in the traces of ancient roads and other antiquities. One such road leads from London through the county to Gloucester; and another, the Ikening Street, traversed the county, but in a direction not fully ascertainable. The only Roman station in the county, the site of which has been satisfactorily settled, is *Spinae*. The name and the distances agree in identifying it with Speen, a village near Newbury. Pontes, another Roman station, has been fixed by Horsley ("Britannia Romana") near Old Windsor, but others prefer Staines in Middlesex. *Calleva* or *Caleva* was thought by Camden to have been Wallingford, but other antiquaries think that its site must have been elsewhere. There is, however, a Roman vallum around Wallingford; at the south-western angle it is very entire for the space of about 270 paces on the south side, and 370 on the west. This vallum is single, and appears to have had a wet ditch, which rendered it very secure.

There are remains of camps in several parts of the county, supposed to have been occupied by the Romans, though some of them are probably of British origin. Among these are Uffington Castle, an oval earthwork on White Horse Hill; Letcombe Castle, a circular earthwork north-east of Lambourn; Hardwell Camp, a square intrenchment near Uffington Castle; and other camps and intrenchments near Faringdon, Easthampstead, Cherbury, Wittenham, Ashdown Park, and Badbury Hill.

Many barrows are found, especially one on the chalk hills north of Lambourn, covered irregularly with large stones; three of the stones have a fourth laid on them in the manner of the British cromlechs. It is called by the peasants Wayland Smith's Cave, and has a traditional story connected with it. The Dragon Hill, under White Horse Hill, and the Seven Barrows on Lambourn Downs, are supposed to be British mounds. Near Lambourn is a curious perforated stone, in which sounds can be produced audible for some miles.

When the Saxons became possessed of South Britain, Berkshire was included in the kingdom of the West Saxons. It was partly wrested from them by the powerful and ambitious Offa, king of the Mercians. At what time it returned under the sway of the West Saxon kings we are not aware; probably it was when Egbert elevated Wessex to a permanent superiority over the other parts of the Saxon Octarchy. It formed part of Wessex under the reign of Ethelwulf (son of Egbert), whose youngest son, the great Alfred, was born at Wantage, in this county. In the reign of Ethelred I., the brother and immediate predecessor of Alfred, the Danes invaded Berkshire, and possessed themselves of Reading; but they were afterwards expelled by Alfred. Mr. Wise thinks that the White Horse, on the ridge of chalk hills, was cut as a memorial of this victory. This White Horse is the figure of a horse cut in the turf on the N.W. face of the range of chalk downs which cross this county at a part where the declivity is at once lofty and steep. It is a rude figure, about 374 feet in length. When the afternoon sun shines upon it, it may be seen at a considerable distance—10, 12, or even 15 miles, and from its immense size forms a remarkable object. It has given name to the hill on which it is carved and to the vale above which that hill rises. The inhabitants of the neighbourhood had in past times a custom of assembling "to scour the horse," i.e. to clear away the turf where it had encroached upon it. On such occasions a rural festival was held, and the people were regaled by the lord of the manor.

In the war with the Danes during the reign of Ethelred II., Berkshire was laid waste with fire and sword. The

barbarous invaders burned Reading, Wallingford, and other places. This was in 1006. At the time of the Norman invasion William the Conqueror received at Wallingford the submission of the archbishop, Stigand, and of the principal barons, before he marched to London; and shortly afterwards a strong castle was built at Wallingford by Robert D'Oyley, one of the followers of the Conqueror. The present name of the county is derived, according to Bosworth, from *Baroscyrre*, "bare-oakshire," from the polled oak in Windsor Forest, where public meetings were held.

In the civil war consequent upon the usurpation of Stephen, Berkshire was again in disorder, the different barons espousing opposite sides. When John rebelled against his brother, Richard I., he seized Wallingford and Windsor Castles, but they were taken from him again by the barons in the king's interest, and placed in the hands of the queen dowager. The strength of these two fortresses rendered them important as military stations in the troubles which took place during the latter part of the reign of John, and during the reign of Henry III. In 1263 Windsor Castle was taken by Simon de Montfort. During this early part of our history, the palace at Old Windsor, or the castle at New Windsor, was the frequent residence of the king. Of the castles of this period, besides that of Windsor, there are only vestiges left of those of Wallingford, Donnington, and Aldworth. Of the old manor-houses there are still left those of Appleton, Withams, Cumnor, Little Shefford, Sutton Courtney, and Ockholt.

During the prevalence of the Roman Catholic faith many religious houses were built and endowed in Berkshire. The most important by far of these establishments were the Benedictine abbeys at Abingdon and Reading. Abingdon Abbey was founded by one of the West Saxons, while Reading Abbey was founded by Henry I. in 1121. Slight vestiges of both yet remain. At Bisham was an Augustinian priory, of which a doorway yet stands. There are also a few existing ruins of the Franciscan church at Reading, and of the Benedictine monastery at Hurley. Specimens of Norman work are visible in many of the Berkshire churches.

In the civil war between Charles I. and the Parliament, Berkshire became the scene of several remarkable contests. Windsor was garrisoned by the Parliament, and continued in their possession throughout the war. It was once attacked by Prince Rupert, but he was unsuccessful. Wallingford was garrisoned for the king, and continued in the hands of the Royalists as long as they were capable of making any stand. In 1642, the first year of the war, the king's army gained possession of Reading, the Parliamentary garrison retiring upon their approach, and the county, with the exception of the parts round Windsor, came into the power of the Royalists; but in April, 1643, the Parliamentary forces, under the Earl of Essex and Major-general Skippon, retook Reading by capitulation. In the latter part of the same year was fought the first battle of Newbury, between the Parliamentarians under the Earl of Essex, and the Royalists commanded by the king in person. The victory was doubtful, but the action has been rendered memorable by the fall of the accomplished Lord Falkland. The town of Reading fell into the hands of the Royalists soon after, and was garrisoned by them, but evacuated the following year. In 1644 Donnington Castle, which was held for the king by a garrison under Captain John Boys, was besieged by a strong detachment of the opposite party; but, though the place was reduced to a heap of ruins, the gallant defenders held out, and the Parliamentarians raised the siege upon the king's approach. Shortly after (viz. 27th October, 1644), a second battle was fought at Newbury, with the same indecisive result which attended the former one. The king commanded his own troops, and the Earls of Essex and Manchester, and Sir William Waller, those of the Parliament. In 1645 Sir Stephen Hawkins made an unsuccessful attempt on the Parliamentary garri-

son at Abingdon; and Cromwell failed in an attack upon Farringdon, but fought a successful skirmish at Radeot Bridge, in that neighbourhood, and took 200 prisoners. In 1646 Prince Rupert attacked Abingdon again, but without success.

BERLIN, a city which derives its name from *berle*, a word implying "uncultivated land" in the language of the Slavonian Wends, who were the earliest settlers in this quarter, is situated in a sandy plain on both banks of the Spree, which divides it into two nearly equal portions, and is 200 feet broad in this part of its course, but has a very sluggish current. Berlin is the largest town in Germany, and for the beauty and size of its buildings, the regularity of its streets, the importance of its institutions of science and art, for its activity, industry, and trade, is one of the finest cities in Europe. It occupies a surface of upwards of 21 square miles, at an elevation of about 125 feet above the level of the sea. It is the seat of government and of the supreme courts of judicature, the greatest manufacturing town in continental Europe, and in regard to population competes with Vienna for the third place among the cities of Europe. The city consists of sixteen different quarters, divided into 210 municipal and police districts. The oldest quarters—Old Berlin, Old Cologne, Friedrichswerder, and New Cologne—form the heart of the city, and were originally inclosed with fortifications. Beyond them is a second zone, the external boundary of which is formed by the ring of streets occupying the site of the old town walls of the eighteenth century, which were removed in 1864-66.

In external appearance Berlin is somewhat deficient in interest; its situation is unpicturesque, and it lacks the charm of mediæval and historical edifices. There is, however, no want of architectural display, the extraordinary growth of the city during the last few years having transformed its whole aspect, and witnessed the erection of handsome buildings in every part.

The number of bridges in Berlin is upwards of fifty; the principal are the Schloss-brücke, or Bridge of the Palace; the Marshal Bridge; and Frederick's Bridge, which is of iron, 215 feet long, between 32 and 33 feet broad, and consists of eight arches of 27 feet diameter, and 5½ feet in height. The number of squares, open spaces, and markets is more than fifty, and of streets 530; while the public hospitals, infirmaries, barracks, riding-schools, magazines, cemeteries, &c., are very numerous. In respect of its churches Berlin is, relatively speaking, the poorest of the capitals of Christendom—possessing only about seventy places of worship to meet the wants of more than 1,000,000 people. Most of them are of the Lutheran state church, to which three-fourths of the inhabitants nominally belong. The number of worshippers in all the churches on an average Sunday is calculated to be less than 2 per cent. of the population; so that the accommodation, small as it is, is more than ample.

The Spree receives, at what is called the "Shipbuilders' Dam," the Panke, which flows through part of the suburb of Spandau; and without the walls is the Sheep or Militia Fosse, which runs out of the Spree near the Silesian Gate, winds along the skirts of Lonia and Frederick's Towns, skirts the Thier garden, which is a sort of open park, and rejoins the Spree in the vicinity of the village of Lietzow. Five canals also—namely, the former ditch of the ramparts, the King's and Shinces' Fosses, and the Lonia and Landwehr canals—are of much utility to the inhabitants.

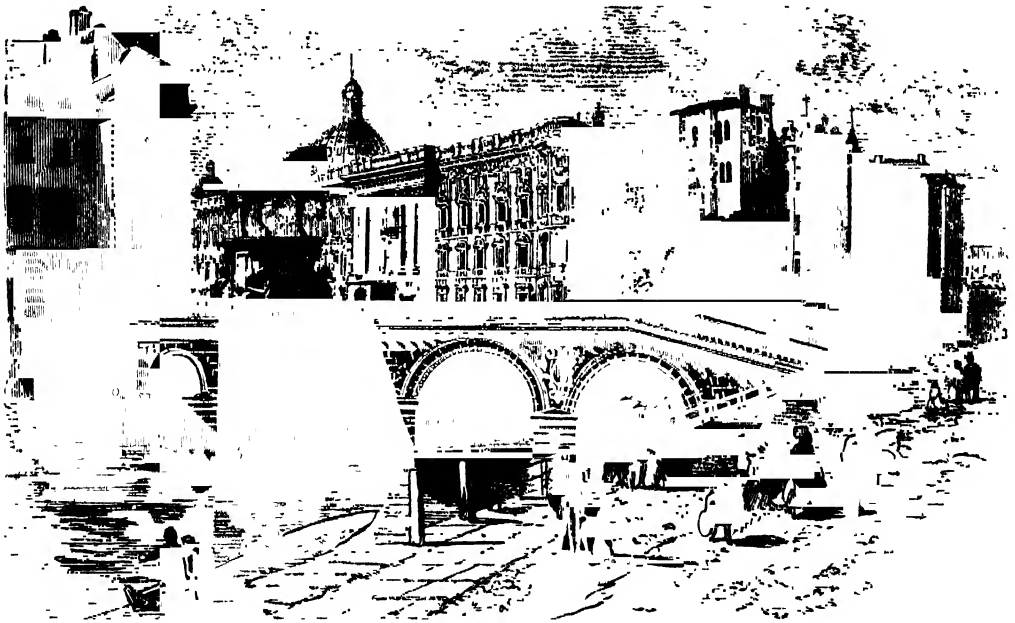
Of the numerous gates of Berlin there is none to be compared with the Brandeburg Gate, on the west side of the town, next the Paris Square, in the Dorotheen-stadt. It is a copy of the Propylæa of the Acropolis at Athens, but on a much larger scale. It was constructed in 1780, and exhibits a double colonnade of twelve columns of the Doric order, each 44 feet in height and 5 feet 8 inches in

diameter, which occupy the centre, with five entrances between them, that in the centre having an iron gate 18 feet high. The structures on each side of it have their roofs supported by eighteen smaller columns 24 feet in height. The pediment, which rests upon the twelve larger and central columns, is surmounted by a Victory standing upon a car drawn by four horses 12 feet high. This was carried off by the French in 1807, and brought back from France seven years afterwards. The entire breadth of the Brandenburg Gate is 199 feet (195 Berlin feet), and its elevation, including the pediment, rather more than 65. The bassi rilievi on the pediment represent Margrave Albert Achilles capturing a standard with his own hands from the Nürnberg troops; and the sculptures in the metopes represent the combat between the Centaurs and Lapithæ. Immediately outside of this gate lies the Thier-garten, which is laid out in walks, avenues, and labyrinths.

Adjoining the Thier-garten is the Königsplatz, in the centre of which stands the Siegesdenkmal, or Victory

column, commemorating the three great campaigns of 1864, 1866, and 1870-71. It stands on a circular terrace, approached by eight steps of granite. On the large base, 62 feet square by 22 feet high, illustrated by relief scenes of the chief episodes of the war, stands an enormous pillar 100 feet high, surmounted by a statue of Victory 40 feet high. The whole surface of the column is covered with mosaics illustrative of Prussian and German victories. It was unveiled on the anniversary of the battle of Sedan, 2nd September, 1873. From the capital of the column, at a height of 152 feet, very fine views may be obtained.

Among the chief buildings in the Berlin Quarter are the Town-hall; the Royal Gymnasium; St. Nicholas Church, built in 1223; St. Mary's Church; the Landschafts-haus, or House of Assembly for Brandenburg; the Lager haus (store-house), in which are several royal manufactories; the King's Gewerbhans (handicraft establishment); the Royal Gymnasium of the Grey Friars, attended by more than 400 youths; the Garrison Church, the largest in



The Royal Palace, Berlin.

Berlin: Frederick's Hospital, or Orphan Asylum; the Stadtverord., or prefecture of the town.

The Old Cologne Quarter is approached by the Long Bridge, on which is a bronze equestrian statue of Frederick the Great. This quarter contains the Cathedral, the royal stables, the armoury, and many other public buildings. But its chief ornament is the Royal Palace, occupying the N.W. side of the Schloss-Platz, or Square of the Palace. The Royal National Gallery was finished in 1873, at a cost of a million thalers.

The Friedrichswerder Quarter is rich in edifices, including the principal mint; the Prince's House; the Royal Bank; the Huntsmen's House (Jägerhaus); the Palace Court; the College, or French Gymnasium; the Tax Office for the metropolis; the Palace of the Princes; the Werder Church, a handsome edifice in the old German style; a splendid arsenal; the Royal Foundry; and the Royal Guard-house. There are also several statues to distinguished Prussians in this quarter.

The Dorotheen-stadt lies to the N. of the preceding, between the Friedrichswerder Quarter and the northern bend of the Spree. Its most striking feature is the celebrated street called Unter-den-Linden, which contains two double lines of linden or lime-trees; it is 2744 feet in length, 174 feet in breadth, and affords the most attractive promenade in Berlin. This quarter likewise contains the University buildings; the Opera House; the Royal Library; the Vocal Academy; the Royal Academy; the Observatory; the Paris Square, on the west side of which the Brandenburg Gate opens, and the east side of which opens on the Unter-den-Linden. The Friedrichstadt Quarter, the largest in Berlin, is traversed in its whole length by the handsome street called William's Street, nearly 9200 feet long. Its other chief objects are the house of meeting for the German Parliament; the Leipziger Platz; the Donhoff Square; the Gymnasium of Frederick William; the Collegien-haus; the Anspach Palace; the palace of the minister of war, to which a fine garden is attached; the palaces of Princes

Frederick and Augustus, and Prince Radzivil, and of the minister of justice; the manufactory of gold and silver works; the palace of the ancient Knights of St. John; the theatre; the Maritime Company's House; one or two open squares adorned with buildings and statues; and the Kreutzberg, on which is erected a monument to the memory of the Prussians who fell in the wars of Napoleon I. A handsome monument to the statesman Stein was erected in 1876, opposite the House of Deputies.

In the various suburbs, or *vorstädte*, of the Prussian metropolis, besides many fine streets and open squares, are the Königsstadt Theatre; the House of Industry; the Blind Asylum; and the Alexandrine Asylum. The celebrated iron trinkets are manufactured near the Oranienburg Gate.

Berlin is the seat of civil and military government for the whole kingdom, and, as will be inferred from our description of its several districts, abounds in literary and scientific establishments, which, when there is need, are liberally supported by the government. The university, founded in 1810, and designated the University of Frederick William, after that sovereign, contains above 190 professors and teachers, and is attended by upwards of 3000 students. Berlin has also four royal gymnasia or high schools, several public seminaries for scholars, civic and rural schools, the Louise Foundation for the education of female teachers, private schools, academies of the arts, sciences, and mechanical pursuits, schools of design, an academy of architecture, district schools for mechanics, public libraries, valuable collections of machines and models, societies of natural history, geography, statistics, horticulture, medicine, and surgery, pharmacy, &c.; and numerous religious, philanthropic, and charitable institutions.

Berlin is growing more rapidly than any other European city; and since the close of the war of 1870-71 its increase of inhabitants and general prosperity has been most remarkable. The population in 1832 was only 250,000; in 1871 it was 826,311; and in 1880 it had increased to 1,122,360. The climate in winter is often excessively cold, and in summer proportionately hot. The city was supplied with water by an English company, and the works were purchased by the municipality in 1874. In spite of recent improvements the drainage of the city is very defective, and the death-rate is exceptionally high. The administration is divided between the police, appointed by the crown, and the city corporation, elected by the inhabitants; and the result is that it is only within very recent years that any decent system of drainage has been attempted, neither body being willing to be responsible for undertaking it.

Berlin is the centre of a system of railways connecting it with all parts of Europe, and has very extensive manufactures. Its chief productions are the celebrated Berlin china, silks, silks and cottons mixed, woollens, cottons, stockings, ribbons, and chemical and dye stuffs, including the celebrated Prussian blue; and next in order are gunpowder, cast-iron ware, silk hats, paper, oils, refined sugars, and tobacco and snuff. It is also a place of extensive commercial dealings. The suburbs of the town have many attractive spots, which are much visited by the inhabitants.

The origin of Berlin is uncertain, but it seems probable that the two villages of Berlin and Cologne (*Köln*) became towns in the times of Margrave Albert II., between the years 1206 and 1220. His successors surrounded these towns with walls, and they seem to have attained a somewhat prosperous state about the period of the extinction of the Anhalt line in 1319. But the disasters which befell them during the succeeding hundred years again reduced them to insignificance. They revived, however, upon the accession of the house of Hohenzollern to the Brandenburg dominions in 1417. The Burg, built by the Elector Frederick II. about 1448, was the site of the present royal palace; and Berlin became the residence of its princes

under John, who died in 1490. It rose rapidly into importance during the long and brilliant career of Frederick William, the great Elector, between the years 1640 and 1688. This prince enriched it with several scientific establishments and collections, and his successor, Frederick III., who afterwards assumed the kingly title, trod in his steps; he was the founder of Frederick's Town, the handsomest quarter of Berlin, and in 1709 conferred the designation of Royal Residence Towns on its respective districts. Even Frederick William I., in spite of his parsimonious habits, did much to embellish it, and also levelled many of the walls and ramparts which obstructed his improvements. Far more, however, was done by Frederick II., his son, from whom Berlin derived most of its present form. His successors have largely contributed to render this city one of the finest in Europe. All the great roads in the kingdom meet in Berlin; and its position on a navigable river, communicating by canals with the Elbe, Oder, and Vistula, renders its navigation of considerable importance.

BERLIN DECREE. After the battle of Jena, 14th October, 1806, Prussia was entirely at the mercy of Napoleon. On the 21st November he issued at Berlin this celebrated decree. It interdicted all commerce and correspondence between the countries under his government and Great Britain.

BERLIN TREATY. This treaty was concluded at Berlin on 3rd August, 1878, as the result of the war between Russia and Turkey. Several important modifications were made by it in the treaty of San Stefano, which had been agreed to between Russia and Turkey immediately after the cessation of hostilities; and the chief provisions of the treaty, as finally settled, were the occupation of Bosnia and Herzegovina by Austria; an addition of territory to Montenegro, Servia, and Greece; the cession to Russia of that part of Bessarabia which had been detached after the Crimean War; the cession of the Dobrukscha to Rumania; and of Batoun, Kars, and Ardahan (in Asia) to Russia; and the erection of Bulgaria into a semi-independent state. A war indemnity of £47,000,000 was imposed on Turkey—to be charged after guaranteed loans and anterior hypothecations.

BERLIOZ, HECTOR, one of the most extraordinary musical geniuses who ever existed. Throughout his career he courted eccentricity; he was in perpetual conflict with his brother musicians or with the public, and often he had a hard struggle to live; nevertheless his views of the province of music, the general bent of his voluminous musical writings, didactic and critical, his mode of handling the orchestra, both as a conductor and a composer, are so just and so powerfully set forth that they form a larger item than would readily be acknowledged in the ordinary musical materials whence the artist of to-day draws his education.

Hector Berlioz was born 11th December, 1803, near Grenoble, in the south of France, and came to Paris as a student of medicine. He soon abandoned medicine for music, and entered the Conservatoire. His father cut him off with a shilling, and he nearly starved, obtaining a mere subsistence as an occasional chorus singer. At the Conservatoire his extraordinary vagaries and his unequalled genius were alike hurtful to his fortunes; no one understood him; and though he there produced orchestral works which are still held to be masterpieces (as the "Overture des Francs Juges," &c.), he was repeatedly passed over in the examinations. At last he won the coveted "Prix de Rome," and studied in Italy for three years, from 1830. The rest of his life after his return to Paris was one long struggle for existence, bodily and musical. It was embittered by the unhappiness of his marriage with Miss Smithson, an actress who had become disabled for her profession by a fall from her carriage, and whom the impulsive composer married very greatly on this account, a former frenzy

for her having in great part evaporated. They separated ultimately, but in money matters and otherwise Berlioz behaved very nobly towards her till her death. His own life closed at Paris in 1869.

Gomod, who owes much to his study of Berlioz, has truly written, "Berlioz died from the prostration of popularity;" and it was not till fully ten years after his death that a great complete work from his pen was heard in England. During 1881 "Faust" was performed again and again in London to enthusiastic audiences, who seemed as if they could never tire of that work which had been almost utterly neglected in the lifetime of its composer. Through his memoirs, and through his letters (excellently translated in 1882 by H. Mainwaring Dunstan), there runs a vein of profound melancholy at his utter powerlessness to reach the heart of his fellow-men. Keenly alive to the grandeur and beauty of his own compositions (now so freely admitted), he felt bitterly that these sublime inspirations were as if produced to a company of deaf persons.

The musical combinations of Berlioz are most remarkable: at one time the clarinets are to be muffled in bags, at another time the double basses are to tune in a special manner; chords produced by many drums at once occur, as in the "Requiem," where eight pairs of drums are wielded by ten players, &c. In his passion he writes to his sweetheart—"Give me an orchestra of 100 performers, and a chorus of 150 voices, and I will tell you how I love you." The number of instruments required for the performance of one of Berlioz's greater works is unequalled save by Wagner, and the unusual shades of tone and effects of musical colour found in his finest compositions are as yet without rivals. It must not be imagined that because the imagination and the musical requirements of Berlioz are thus colossal that his music is noisy. He delights in grandiose effects now and then, it is true; but passages of more exquisite delicacy are to be found in his works than in those of almost any composer. Probably the reasons why this great man is even yet denied his true position are these amongst the chief—his frequent deficiency of tunefulness, as distinct from melody; the great musical ability required, and the large expense necessary to produce his larger works; the great demands he makes upon the attention, i.e. his chief charm is in the incessant variations of tone colouring; and finally his complete individuality, which shocks the prejudiced and deters the busy, since it needs some considerable acquaintance with the peculiar rhythms and effects which constitute his musical speech to understand that which others who follow the beaten track communicate with ease.

Amongst his greatest works are the "Requiem" (Op. 5); the remarkable "Episode de la Vie d'un Artiste," with its sequel, "Lelio;" "Harold en Italie," the solo part written for Paganini's famous viola, after Berlioz had received from him a gift of 20,000 francs, as the "successor of Beethoven;" "Romeo and Juliet;" "Benvenuto Cellini" (opera); "La Damnation de Faust;" "L'Enfance du Christ" (in the character of an oratorio); "Beatrice and Benedict" (opera); and "Les Troyens" (opera). Many of these are entirely original in form; some have served as models for other composers, but the greater part are quite inimitable. The wonderful "Rakoczy March" occurs in "Faust." The finest treatise on instrumentation, in fact the only one of acknowledged prime importance yet written, is due to this consummate master of tone.

Berlioz came to England in 1852 as conductor of the new Philharmonic concerts, and also produced his opera "Benvenuto Cellini" at Covent Garden in 1853; but at that time very few took the pains to understand him. His living was obtained not by his scores, but by his vigorous contributions to the Paris journals; for though the Parisians would not hear his music, they gladly laughed over the brilliant wit and caustic humour of his pen—a terrible

grief to the author, to whom this work was at once a hated drudgery, and a conscious degradation from the grand work for which he felt himself designed.

BER MONDSEY (ea or ey, "island" Bermud's island), a suburb of Southwark, London, which it adjoins on the east, occupies a low level area on the bank of the Thames. A monastery formerly stood here, within whose walls died Katherine, the widow of Henry V., and Elizabeth Woodville, widow of Edward IV. The parish church was erected in the reign of Edward III. The chief industrial occupations are connected with tanning and leather dressing. The population in 1881 was 86,652.

BERMUDAS, or SUMMERS ISLANDS, are situated in the North Atlantic, 580 miles E. by S. $\frac{1}{2}$ S. from Cape Hatteras in North America, the nearest point of land, and 645 miles N.E. of Attwood's Keys, the nearest of the West India Islands. The name Bermudas is derived from the supposed discoverer, Juan Bermudez, a Spaniard, who is said to have touched there in 1522; or, as it is in May's account, from a Spanish ship called *Bermudas* being cast away there. The first printed account of them in England seems to be by Henry May, who being on board a French ship, commanded by M. de la Barbotier, was wrecked on them in 1593. The second and less common appellation is from Sir George Sommers, or Somers, who was driven upon them in 1609, on his voyage to Virginia. King James I. gave a charter to a company of 120 persons for a settlement, which by the year 1619 had become prosperous, and had increased to above 1000 whites. A General Assembly was formed in 1620. The islands have never since passed out of the hands of the English.

The climate of the Bermudas, except for three summer months, is mild, genial, and salubrious, though during southerly winds, which are the most prevalent, the atmosphere becomes charged with humidity. The fields and trees are always green. Snow never falls; the rains are few, though heavy while they last. The islands are, however, very subject to tempests, hurricanes, and thunderstorms. They are well protected from ocean-storms; but they are surrounded by dangerous rocky reefs, extending in some parts 10 miles from the islands, which render them very difficult of access. The few channels through the reef are thickly studded with coral rocks, but the water is so beautifully clear that they are visible to the eye.

The islands lie in a N.E. and S.W. direction, including a space 25 miles in length, and less than 5 in the greatest breadth; they are all low, the highest point, called Tibb's Hill, at the southern extremity of the large island, being only 200 feet above the level of the sea. There are no springs or fresh-water streams in the islands, and but few wells.

The number of islands is about 300, but not more than twelve are inhabited. There are two towns, St. George's being the military headquarters, and Hamilton the seat of government. A causeway between the two places, chiefly for military communication, was completed in 1872. The protection afforded to shipping by their numerous bays, their position in the track of homeward-bound West India ships, and in the most advantageous locality for refitting the ships of war employed in the West India and American seas, have led to the conversion of the Bermudas into a principal maritime station. The harbour of St. George's has water enough to float, and space enough to accommodate, the whole British navy. Formerly the entrance to it was very much obstructed, but it is now greatly improved; a dockyard has been built on Ireland Island, and some very strong fortifications have been erected on it and on St. George's for the security of the colonists and shipping. In 1869 an immense floating dock was successfully towed to the Bermudas from London. It was constructed in order to provide accommodation for cleaning the bottoms of vessels belonging to the royal navy on the West India and North American stations. Its dimensions are 381

feet in length, 123 feet 9 inches in extreme breadth, and 74 feet 5 inches in depth. A dock space of 333 feet in length by 83 feet 9 inches in width, enabling it to receive a vessel of 3000 tons, is inclosed in caissons at a distance of 24 feet from each end. The Bermudas are the usual summer residence of the admiral in command of the North American station, and they are the health resort of many visitors from the American mainland.

The surrounding seas abound with various kinds of fish and turtle, and the Bermudans are among the most dexterous of fishermen, more particularly with the harpoon. The whale fishery is important to the inhabitants, as the

flesh is eaten by the natives. There is scarcely any vegetable that will not grow on Bermuda. Potatoes, onions, cabbages, carrots, turnips, barley, oats, pease, beans, pumpkins, melons, &c., are cultivated. The citron, sweet orange, lemon, and lime, are of good quality; and the arrow-root is said to be superior to that of any other place. The palm-tree also grows, and the leaves are exported for ladies' fans. Formerly Bermuda possessed a fleet of 100 merchant ships, but it has now dwindled down to four or five, and the carrying trade has altogether disappeared. The total loss of their shipbuilding and carrying trade was severely felt, and would have been followed by a period of great and



The Bermudas.

general distress had not the population turned to agricultural pursuits so successfully that they have gradually become a comparatively prosperous agricultural community.

The government of Bermuda is modelled after that of Great Britain—the concurrence of the governor, council, and legislative assembly being necessary to give to any public measure the force of a law. The constitution consists of the governor and a privy council of ten members, appointed by the crown, on the nomination of the governor, who also act as a legislative council. There is a House of Assembly of thirty-six members, representing all the parishes in the island. The revenue and expenditure are each about £30,000 per annum; the tonnage of vessels which enter and clear yearly is 190,000, of which 120,000 are under the British flag; the value of the imports is £260,000, and of the exports £65,000. The governor of the colony resides at St. George's. The population in 1883 was 13,500—40 per cent. white and 60 per cent. coloured.

BERN, CANTON OF, the largest and most populous canton of Switzerland, extends about 85 miles from N. to S., from the French and Alsatian frontiers to the high chain of Alps which divides the southern valleys of the Bernese Oberland from the canton of Valais. Its shape is very irregular, like that of most Swiss cantons, and its breadth therefore varies considerably, from 30 to 60 miles. Its area is about 2662 square miles. The population in 1880 numbered 532,161, of whom about seven-eighths were Protestants.

The southern part of the canton is very mountainous, consisting of high valleys between the offsets of the chain of Alps which divides it from the Valais and from Uri and Unterwalden. Further north, and round the city of Bern, the ground, although hilly, is not rugged, and consists of pleasant fertile valleys, and some level tracts. The most northern part, beyond Biemme, which formerly constituted the territory of the Bishop of Basel, is almost entirely covered by the various ridges and offsets of the Jura Mountains up to the frontiers of France. Some of the Jura summits are 5000 feet in height; but the mountains of Schreckhorn, Wetterhorn, Jurafran, and Finsteraarhorn, all near the southern margin of the canton, vary from 12,000 to 14,000 feet in height. Extensive glaciers cover the sides of some of these mountains. The principal rivers are the Aar, the Emmen, the Simmen, the Thiele, the Saane, and the Birs; all of these are not of any importance except the Aar.

The climate of the canton of Bern, and the produce of the soil, vary greatly according to the nature of the ground and the position of the valleys. The Oberland, or southern part, is very cold in winter; cattle forms the chief property of the inhabitants, who are mostly poor. The Simmenthal is the best valley in this district. The central part, near Bern, the country between the Aar and the Emmen, and east of the latter river towards Lucerne, constitute the finest and most fertile parts of the canton, and produce corn, fruits, and rich pastures. The farms are extensive, the

farmers wealthy, and their houses, built mostly of wood, are roomy and comfortable. It is the richest agricultural district in Switzerland. The roads through the canton of Bern are wide, well constructed, and kept in excellent repair.

The canton is divided into districts or prefectships, formerly called bailiwicks, of which there are twenty-two in the old territory of Bern, and six in the territories acquired in 1815. The towns of the canton, besides Bern, are—Bienne, Burgdorf, Thun, Porentrui, and Delémont.

The canton of Bern produces corn, though not sufficient for the consumption of the population, and fruit in abundance, especially apples, pears, plums, nuts, and cherries. From the cherries the spirit called *kirschwasser* is made, which, as well as the extract from absinthe, or wormwood, are articles of common use, as in the rest of Switzerland. Beer and cider are also made. The vine thrives in a few districts, chiefly in that of Nidau, near the lake of Bienne, where wine is made. Hemp and flax are also among the products of the soil, but cattle and the products of the dairy constitute the chief wealth of the country; cheese is made in abundance for exportation, especially in the valleys of Emmenthal, Simmenthal, and Gesseuai or Saanen. The use of coffee and sugar is universal even in the most secluded valleys. Irrigation and the making of artificial meadows are much followed in the valleys, and the mountains afford summer pasture in abundance. There are dairies in common, where the milk of several herds is put together and made into butter and cheese.

The land, as in most other parts of Switzerland, is divided equally among all the children. When the farmers are in good circumstances, the law of inheritance does not produce a too great subdivision of land, as one of the sons generally purchases or rents his brothers' shares, or the brothers continue to live together and cultivate the farm in common. In the Emmenthal the land descends to the youngest son, who pays his brothers and sisters their portion by mortgaging the estate. But in the poorer districts, such as the Oberland, the increase of the population, the minute subdivision of property, and the consequent practice of raising money by mortgages, have rendered the population exceedingly poor.

The canton of Bern is not, properly speaking, a manufacturing country. Linen is made in many places, sufficient for the internal consumption; there are tanneries at Bern, as well as a few manufactories of silks, coarse woollens, and paper. Mathematical instruments, watches, and jewelry, muskets, and other arms, are made at Bern, Porentrui, &c. The Bernese gunpowder is excellent. At Correndelin, Untervelier, and other places in the valleys of the Jura, there are iron-works and foundries, the iron ore being found in abundance in the mountains. Timber for building and fuel are supplied by the mountain forests, and from other woods in several parts of the lowlands.

The lakes of Bienne and Thun and the river Aar abound with various sorts of fish, especially of the trout and salmon kinds. Hares, chamois, marmots, and partridges are the principal game. Bears and wolves are found in the higher Alps, but in small numbers. Among the birds of prey, the hammer-geier, the great vulture of the Alps, is the largest, though not very common; some are of very great size, and will carry off a lamb to the mountains, from which circumstance their name is derived.

This canton entered the Swiss Confederation in 1353; at first its territory was very limited, but afterwards, by conquest and purchase, it acquired nearly the whole of the now existing canton of Vaud and Aargau, which, in addition to its present extent, it held till 1798, when it was taken by the French. In 1815, in indemnification of Vaud and Aargau, the Congress of Vienna added to its dominion the town of Bienne with its territory, and the greater part of the ancient bishopric of Basel, otherwise entitled the baillages of the Jura.

There are elementary schools all over the canton, and also gymnasia and schools for artisans. In the higher departments of education there is a well-appointed university at Bern, and two or three military schools.

The language of the bulk of the people of the canton of Bern is the Swiss-German, but various dialects prevail in the different districts or valleys. The dialect of the Ober Hasli is peculiar, and is said to contain many Swedish words or roots. Almost all the educated people of the towns, and especially of Bern, understand and speak French. In some of the valleys of the former bishopric of Basel French is spoken by the people in general.

The character of the Bernese peasantry is steady, serious, and slow, but they are subject to fits of violent passion when excited. The educated people of the towns are refined and polite, and hospitable to strangers. The peasantry are healthy and robust, and the women in some of the valleys are remarkably handsome. Their costume and head-dress are very picturesque.

Bern holds the second rank in the Federal Diet.

BERN, the capital of the canton of Bern, and since 1819 the permanent seat of the Swiss government and Diet, was founded in 1191 by Berthold V., duke of Zähringen, for the purpose of keeping in check his refractory nobility. In 1218 it was raised to the rank of a free town of the empire. In 1353 it entered the Swiss Confederation, then consisting of seven cantons. In 1798 Bern was obliged to open its gates to the French army, and the canton was dismembered. From 1799 to 1803 it was the seat of the Helvetic government.

Bern stands on a somewhat long and elevated peninsula, formed by the river Aar, which runs on three sides of it, the fourth side being open to the west, and fortified. There is a stone bridge over the Aar, about 900 feet long. The town may justly be reckoned among the most elegant cities in Europe. Its style of building is very regular, without appearing monotonous; the streets are broad, and run parallel from east to west; they have, for the most part, arcades on both sides, with good shops, and communicate by cross streets. There are a great number of fountains in the city, many of them ornamented with statues, some of which refer to historical events. The Münster, or cathedral, the Citizen and Island Hospital, the corn-magazine, the town-hall, the Schallarhaus, or house of correction, the armoury, the orphan-house, the theatre, the library, and the museum, are the chief buildings. Near the town are two beautiful promenades, the Plateforme and the Engé; and the environs afford the most splendid views of the Alps on the one hand, and the Jura on the other.

Bern is the birth-place of Müller; it has not, however, to boast of so many distinguished men as Zurich, Basel, and Geneva. The town is supposed to derive its name from the old Saxonian word for bear; it has bears for its arms, and some of these animals are maintained by the municipality in a place called *Bärengraben* (bear's ditch), from funds appropriated to that special purpose. In 1861 an English officer fell into the den while attempting to walk along the railings above it, and was killed after a desperate struggle.

Bern is not properly a manufacturing place. The chief trade is with the produce of the country. There are yearly exhibitions for encouraging industry and agriculture. A great deal is done in banking. There are breweries, tanneries, a manufacture of straw hats, &c.

The town has a good public library of 30,000 volumes, and a richly-endowed museum of natural history. There are also many private collections of minerals, plants, coins, &c., and two botanical gardens. The corporate property is so considerable that it is sufficient to defray all municipal expenses, and to give the citizens advantages and immunities which are not to be found in any other city in Europe. The university was founded in 1834; the other

establishments for education are good, and much is done for the instruction of all classes. The population in 1883 was 45,000.

BERNADOTTE, JEAN BAPTISTE JULES, Charles XIV. of Sweden (Carl XIV. Johan), was born at Pau in the Béarnais, in January, 1764. He entered the army when seventeen years of age, and rose by his good conduct to the rank of adjutant, in which capacity he was serving at Marseilles in 1790, when the Revolution began. Bernadotte now rose rapidly; he was successively colonel, chief of brigade, and general of division. He served in 1795-96 against General Clairfait and the Archduke Charles; and in 1797 under Bonaparte in Italy, to whom he was sent with a reinforcement of 20,000 men. Bernadotte distinguished himself at the passage of the Tagliamento and on other occasions; but after the treaty of Campo Formio, feeling offended at Bonaparte having ordered away part of the troops he had brought, he tendered his resignation to the Directory, who appointed him ambassador at Vienna. In this office he behaved with much moderation and conciliation as to cause him to be suspected by the Directory, who ordered him to hoist the tri-coloured flag above the entrance of his hotel. This was done on the 13th April, 1798, and produced a riot, in consequence of which Bernadotte left Vienna in August, 1798. Bernadotte married at Paris a younger sister of Joseph Bonaparte's wife, of the name of Clary. In the following year he was appointed minister-at-war, but was soon dismissed, and was living unemployed at Paris, when Bonaparte arrived from Egypt. Bonaparte tried to bring him into an acquaintance with his views previous to the revolution of Brumaire, but Bernadotte firmly refused. Bonaparte, having become first consul, gave Bernadotte the command of the army of the west, for the purpose of pacifying La Vendée and the other disturbed districts. After Napoleon's assumption of the empire he made Bernadotte a marshal, and sent him, in 1804, to command the army which was stationed in Hanover, where by his moderation and kindness he laid the foundation of the good reputation which he acquired in North Germany, and which afterwards contributed materially to raise him to the throne of Sweden. From 1805 to 1809 Bernadotte was with Bonaparte in his campaigns in Germany, and at the battles of Ansterlitz, Jena, Friedland, and Wagram. After the battle of Wagram he had a dispute with Bonaparte, and retired. At the beginning of 1810 Napoleon offered him the situation of governor-general of the Roman state which Bernadotte accepted.

Meantime important events had taken place in the north, in which Bernadotte was to act an unexpected part. Gustav IV., king of Sweden, had been obliged to abdicate in March, 1809, on account of his incapacity. His uncle, who succeeded as Charles XIII., was childless. On 21st August, 1810, the Diet, at the king's suggestion, voted Jean Baptiste Jules Bernadotte, prince of Pontecorvo, to be prince royal of Sweden and heir to the throne, on condition of his adopting the communion of Augsburg. Charles XIII. at the same time formally adopted him as his son. After some delay, occasioned by Napoleon stipulating for terms that Bernadotte did not feel warranted in acceding to, he arrived at Stockholm. He addressed the king and the States in succession, declaring his intention to live entirely for the good of his adopted country. Within two days despatches arrived from Napoleon, demanding in the most imperious tone that Sweden should declare war against England, which was reluctantly agreed to. But Napoleon did not stop here; he demanded Swedish sailors for the French fleet, Swedish troops for the French army, the introduction of French custom-house officers at Gothenburg, and other things, all of which were refused. After a series of disputes, in January, 1812, the French troops invaded Swedish Pomerania and the island of Rugen. An envoy was sent by Sweden to St. Petersburg to conclude

an alliance with the Emperor Alexander, which was signed 24th March. The accession of Great Britain to the treaty was solicited, and after a time obtained. The treaty was signed at Abo, 18th August, 1812.

In May, 1813, the prince royal landed at Stralsund with about 25,000 Swedes, and advanced towards the Elbe. He contributed materially to the success of the campaign, of which he formed the plan; he took no part in the campaign in France, in 1814, but directed his efforts to the securing of Norway, which, by a treaty of 14th January, 1814, Denmark agreed to resign to Sweden, but which the Norwegians, under Christian the crown prince of Denmark, refused to ratify till a Swedish army and fleet were at length put into motion, when they ultimately elected Charles XIII. of Sweden to be king of Norway, and Carl Johan to be prince royal. Carl XIV. Johan was proclaimed, both in Sweden and in Norway, king on the death of Charles XIII. in 1818, and was in due time acknowledged by all the princes of Europe. The twenty-six years of the reign of Charles XIV. were for Sweden and Norway a period of peace and internal improvement. Every branch of the administration, the finances, the navy, the army, the roads and canals, public instruction, all were much improved. Agriculture also made great progress; Sweden, which was obliged to import large supplies of corn, now produces enough for itself, and even exports corn.

Charles XIV. had completed his eightieth year when he was seized by an illness in January, and died on the 8th of March, 1844. His son, Oscar I., succeeded him. Upon the whole, the life of Charles John Bernadotte is one of the most instructive biographies of our own times. It affords subject for serious reflection, and is a useful comment on the history of Napoleon.

BERNARD, CLAUDE, the distinguished French physiologist and brilliant experimenter, was born at St. Julien, near Villefranche, in 1813. He took his doctor's degree in medicine in 1843 at the University of Paris. He quickly became one of the leading men of science, directing his attention to problems of physiology and of biology. He opened quite a new field of observation. Unlimited patience and resources in experiment are amongst the characteristics of Bernard, and his conclusions, though never dogmatically put forth, are therefore very difficult to shake. His work on the Liver (1853); his "Leçons de Physiologie expérimentale, appliquée à la Médecine" (1855); his work on the Pancreas (1856), which marked an epoch in the study of digestion; his researches on animal heat, "Mém. sur la Chaleur animale" (1876); his "Nervous System" (1858); his "Liquides de l'Organisme," &c., are authorities, each one of which is in its department a new departure in biological science. After receiving almost every possible honour, Claude Bernard died 10th February, 1878. He wrote to the last, his two interesting volumes on biological phenomena common to animals and plants appearing in the year of his death.

BERNARD DOG, GREAT ST., is a large powerful dog with close short hair and drooping ears. These dogs derive their name from the Hospice of St. Bernard, where the monks train them to rescue travellers overwhelmed in snowstorms or avalanches. They are sent out in bad weather in pairs, one with a warm cloak fastened to his back, the other carrying round his neck a little basket containing brandy and some bread. They either conduct the traveller to the convent or, if he has sunk in the snow, bring the monks to the rescue by loud barking. One of these dogs, named "Barry," saved no less than forty lives. The St. Bernard dog is considered to be a breed between the English mastiff and the shepherd's dog of the Alps. The pure breed has, however, become extinct, owing to the death of all the female dogs of the hospice during one extremely severe winter, and the monks had to resort to a cross strain to keep up the race. The St. Bernard was

introduced into England by the late Mr. Albert Smith and the Rev. G. C. Macdonald. A St. Bernard club has been formed, and a show exclusively devoted to dogs of this breed was held at Knightsbridge Riding School in November, 1882.

BERNARD, GREAT ST., one of the chief mountain passes in the Pénine Alps between the Swiss Valais and Piedmont. "This pass, which is rather more steep and difficult on the Swiss than on the Italian side, is only practicable the whole way for mules and pedestrians. The most elevated part of the passage of the St. Bernard is a long and narrow valley, the bottom of which is occupied by a lake. The height of this valley above the level of the sea is stated at 8200 English feet. At the eastern extremity of the lake, which is frozen over during eight or nine months of the year, stands the celebrated Hospice or Monastery of St. Bernard; and at the other end of the lake there is a small level space, called the Plain of Jupiter, where in ancient times there stood a temple of that god, and probably a house of refuge, built by the Romans. From the temple the mountain derived its name, it being anciently called Mount Jovis, which was corrupted into Mont Joux; and it bore the latter name until the celebrity of the hospice, which was built here by St. Bernard about A.D. 962, gave it a new and a Christian designation.

The monks of St. Bernard are of the order of St. Augustine. Considerable landed property was once attached to this humane and useful establishment, but it now mainly depends on the voluntary donations of private individuals and travellers. It extends relief and eleemosynary hospitality (when needed) to all classes and conditions of men; and the Protestant Swiss contribute as readily to it as the Catholic Italians. The exertions of these monks to rescue lost travellers from the snow and the avalanche, and stories of their dogs, are well known. The monastery is the most elevated fixed habitation in Europe, and close upon the limits of perpetual snow. It affords sleeping accommodation for seventy or eighty persons, and shelter for 300. The monks commence their humane mission at eighteen years of age, and vow to remain fifteen years; but the severity of the climate often ruins their health and shortens their lives, and compels them to leave at an earlier period.

The present massive edifice dates from the middle of the sixteenth century, the church from 1680. The walls of the dining room are hung with engravings and pictures, the gifts of grateful travellers. A chapel to the left of the entrance to the church contains the monument erected by Napoleon I. to General Desaix, who fell at the battle of Marengo in 1800.

Near the hospice is the *Morgue*, a receptacle for the bodies of persons who have perished in the snow. The coldness and dryness of the air retard decomposition so remarkably that the features of the deceased are sometimes recognizable years after death.

During the Italian campaigns of 1798, 1799, and 1800, the pass was crossed by several hundred thousand soldiers, both French and Austrian. In 1799 the Austrians endeavoured to pass the hospice, but after several fierce engagements the French remained masters of the pass, and kept a garrison of 180 men in the hospice during a whole year. It is also an historical fact that the Romans made use of this route in B.C. 100. After the foundation of *Augusta Pretoria Salassorum* (Aosta, B.C. 26) it became more frequented. Constantine caused the road to be improved in 339. The Lombards made the passage about 547; Bernard, an uncle of Charlemagne, marched an army by this route into Italy in 773, and, according to some, gave his name to the pass; and part of the army of Frederick Barbarossa also crossed in 1166, under the command of Berthold of Zahringen.

Besides the Great St. Bernard, there is the Little St. Bernard, which lies between the Tarentaise and Piedmont,

and forms part of the chain of the Graian Alps. It is generally believed that it was by the pass of Little St. Bernard that Hannibal led his forces into Italy.

BERNARD, ST., Abbot of Clairvaux, was born at Fontaines, in Burgundy, in the year 1091. From his infancy he was devoted to religion and study, and after having been educated at the University of Paris, at the age of twenty-two he entered the Cistercian monastery of Cîteaux, near Dijon in Burgundy. His sincere enthusiasm drew after him many friends and neighbours to the seclusion of the cloister. No one seems to have been able to resist the charm of his eloquence. The Cistercian order was at that time the strictest in France, and Bernard so recommended himself by the most rigorous practice of its austerities that, in the year 1115, he was selected as the head of the colony which started out from Cîteaux to found the abbey of Clairvaux in Champagne. Not content with restoring the simplicity of the rule of St. Benedict, as was his aim at first, Bernard passed onwards ever to new austerities. Sleep he despised as waste of time, food as gross necessity. As far as life would bear it he abjured both.

His reputation soon rose so high that in 1128 he was employed by the grand-master of the Templars to draw up the statutes of that order. He supported the claims of Pope Innocent II. against those of his competitor Anacleto, and gained the governments of France, England, and the Empire to his side; and soon after was offered the archbishopric of Milan by the clergy of that see; this he refused, as he did subsequently those of Genoa and Rheims. Having condemned as heretical some propositions in the works of the celebrated Abelard, he was challenged by him to a public controversy. In the year 1140 they met at the Council of Sens in Champagne, but before the discussion was completed Abelard appealed to the pope, who condemned his propositions, and confined him to the monastery of Cluni, in Burgundy. During the course of his life Bernard attacked several other heresies. At the council of Vézelay, on the confines of Burgundy and Nivernois, in the year 1146, Bernard persuaded the king and nobility of France to enter on the second Crusade. On this occasion he went so far as to claim inspiration, and to prophesy the success of the undertaking. Louis VII. and the emperor, with all their armies, were, however, utterly ruined; and a torrent of execration poured over the head of the author of this desolation. The last act of his career was his mediation between the people of Mentz and some neighbouring princes. On his return to his convent he fell ill, and died in 1153. He was canonized in 1174 by Pope Alexander III.

Luther's glowing testimonies to the worth of St. Bernard are well known. "If," says he, "there ever lived on the earth a God-fearing and holy monk, it was St. Bernard of Clairvaux." His enthusiasm was equalled by his fearlessness and his incorruptibility. He denounced a wrong in the pope as freely as in one of his own monks. Many of his writings are poetical in feeling; the number of his works is great. The latest edition, containing his life by his friend and scholar Godfrey, appeared in Paris in 1851 in four vols.

BERNARDINES, a branch of the Benedictine monastic order, more frequently called Cistercians. Their name of Bernardines was derived from St. Bernard, abbot of Clairvaux, about A.D. 1115, who was a great promoter of their order. They were called Cistercians from Cistercium or Cîteaux, in the bishopric of Châlons in Burgundy, where the order was begun in the year 1098 by Robert, abbot of Molesme, in that province, but brought into repute by Stephen Harding, an Englishman, third abbot of Cîteaux, who is therefore reckoned the principal founder. They were also called White Monks, from the colour of their habit. Fuller, in his "Worthies" (book iii. p. 164), probably errs when he makes the Bernardines to be a stricter order of Cistercians.

The monasteries of the Bernardine or Cistercian order, which became very numerous in a short time, were generally founded in solitary and uncultivated places, and were all dedicated to the Virgin Mary. The Bernardines or Cistercians were transplanted into England from the Abbey of Aunone in Normandy, in 1128, by Walter Giffard, bishop of Winchester, who placed them in his newly-founded Abbey of Waverley in Surrey. In the 26th Henry VIII. the number of Bernardine or Cistercian abbeys in England, of which thirty-six were among the greater monasteries, amounted to seventy-five, besides twenty-six Cistercian nunneries. The total revenue of the Cistercian houses in England amounted to £18,691 12s. 6d. St. Bernard's College in Oxford (afterwards refounded as St. John's College) was founded by Archbishop Chichele in 1437, for scholars of the Cistercian order who might wish to study in Oxford. The figure of St. Bernard still stands in a niche in the upper part of St. John's College tower. The habit of this order was a white cassock with a narrow scapulary, and over that a black gown when the monk went abroad, but a white one when he went to church. The lay brethren were clad in dark colour.

BERNAY, the capital of an arrondissement of the same name, in the department of Eure, France, stands on the left bank of the Charentonne, has tribunals of first instance and of commerce, a college, savings bank, and 7285 inhabitants. Judith de Bretagne, Richard II.'s queen, had this town as part of her dowry, and founded an abbey in it. The abbey church, the nave of which is remarkable for its severe simplicity and unadorned elegance, is now used as the Hotel de Ville. In the abbey buildings the subprefect and the mayor reside, and the courts of justice are held. The other important buildings are the churches of Saint-Croix and De-la-Couture, the college, and the hospital. The chief manufactures are woollen cloth; but flannels, tape, linen, leather, &c., are made. There are also dye-houses and bleaching establishments, and a good trade in corn, cider, iron, paper, hides, and cattle. One of the greatest horse fairs in France is held here during the fifth week of Lent.

BERNERS, DAME JULIANA, one of the earliest female writers in England, is supposed to have been born, towards the latter end of the fourteenth century, at Roding Berners in Essex. Her brother Richard (created Lord Berners in the reign of Henry IV.) was the father of the translator of Froissart. She was prioress of Sopewell Nunnery, near St. Albans, in Hertfordshire. It seems that she was alive in 1460.

The following is the collected title of the treatises attributed to Juliana Berners, as printed by Wynkyn de Worde in 1486 and 1496:—"The Treatyses pertynyng to Hawkyng, Huntynge, and Fysshynge with an Angler; and also a right noble Treatyse of the Lygynge of Cot Armouris, endynge with a Treatyse which speyffyth of Blyssynge of Armys." Mr. Hazlewood, whose investigations seem to have thrown all the light on the subject of the book and its author of which it is susceptible, narrows the claims of Juliana to a portion only of the treatises. See his preface to the facsimile reprint of the whole of Wynkyn de Worde's edition, which was issued by him in 1810.

BERNICLE GOOSE. See BARNACLE GOOSE.

BERNINI, GIOVANNI LORENZO, born at Naples in 1598, was the son of Pietro Bernini, a Florentine painter and sculptor, who afterwards removed with his family to Rome, being commissioned by Pope Paul V. to work at the Borghese Chapel in Santa Maria Maggiore. Young Bernini, at ten years of age, made a head in marble which was much admired; and at seventeen he made the fine group of Apollo and Daphne, which was afterwards placed in the Villa Borghese. He studied architecture as well as sculpture, and was patronized and employed in both by the popes Paul V., Gregory XV., Urban VIII., Innocent X.,

and Alexander VII. The principal works of Bernini were—1, the Confession of St. Peter's, i.e. the bronze columns and canopy under the dome; 2, the Palace Barberini, and the fountain in the square before it; 3, the front of the College de Propaganda Fide; 4, several other fountains in Rome; 5, various works and ornaments in the interior of St. Peter's; 6, the great fountain in the Piazza Navona; 7, the piazza before St. Peter's; 8, the splendid colonnade, and also the great staircase leading from the portico of the church to the Vatican Palace; 9, the Cathedra or great chair of St. Peter's, of gilt bronze. The Palazzo Bracciano at Santi Apostoli is also one of his works, though not among the best. The elegant church of Sant' Andrea in Monte Cavallo is likewise by him.

When forty years of age Bernini married Caterina Fezi, the daughter of a respectable citizen of Rome. In 1665, at the urgent request of Louis XIV., he visited Paris, where he remained for eight months, being employed on several works of sculpture, including a bust of Louis XIV.; and on his return to Rome he made an equestrian statue of Louis XIV., which was afterwards placed at Versailles. Clement IX., who succeeded Alexander VII., employed Bernini in several works, among others the Villa Rospigliosi near Pistoja, and the altar of the Rospigliosi Chapel at Pistoja. When eighty years of age Bernini executed a statue of Christ in marble, which he bequeathed to Queen Christina of Sweden, who had been his constant patroness. He died at Rome 28th November, 1680, leaving a fortune of £100,000 to his children.

Bernini was a painter as well as sculptor, and left about 150 paintings, most of which were purchased for the galleries of Barberini and Cligi.

BERNOULLI, the name of a family which is as well known in the history of mathematics as the family of Bach in music. The family is said to have originally belonged to Antwerp; it finally settled at Basel. **NICOLAS BERNOULLI**, the immediate ancestor of the subjects of this notice, held a high station in that republic. He had eleven children, of whom two are the most distinguished of the eight Bernoullis, and another was the father of a third.

The first of these, **JAMES BERNOULLI**, was born at Basel, 27th December, 1654. His father intended that he should be a divine, and had him taught the classics and scholastic philosophy, but no mathematics. Accident threw geometrical books in his way, and he studied them with ardour. His lasting fame dates from the year 1684, in which Leibnitz published his first essays on the Differential Calculus in the Leipzig Acts. From this time he and his brother John applied themselves to the new science with a success and to an extent which made Leibnitz declare that it was as much theirs as his. In 1687 he was elected professor of mathematics at the University of Basel. The integral calculus was first inquired into by James Bernoulli in 1691. His future labours were, in a great measure, developments of the inexhaustible method of investigation just named. He died at Basel of a slow fever, 16th August, 1705, in his fifty-first year. After the example of Archimedes, he ordered that one of his discoveries should be engraved on his tomb. It was a drawing of the curve called by mathematicians the logarithmic spiral, with the inscription *Eadem mutata resurgo*; a double allusion, first, to his hope of a resurrection, next, to the remarkable properties of the curve, well known to mathematicians, which consist in this, that many operations which in most instances convert one curve into another, in the logarithmic spiral only reproduce the original. His complete works were published at Geneva, 1741, in two vols. 4to.

His brother, **JOHN BERNOULLI**, was born in 1667. His father intended him for commercial pursuits, and sent him to the University at Basel in 1682, where he also found his own vocation. In 1693 he was elected professor of

mathematics at Wolfenbüttel; but on his marriage with a lady of Basel in 1694 he returned to his own country, and was received doctor of medicine, his thesis being the "Motion of the Muscles." In 1695 he accepted a professorship at Groningen, at which place he remained till he succeeded his brother James at Basel in 1705, where he died 1st January, 1748.

He published no separate works, but his memoirs, containing an immense mass of discovery, are to be found in all the scientific transactions of his day. They were collected in four quarto volumes by Cramer, and published at Lausanne and Geneva in 1742. The mathematician should consult the "Eloge" of D'Alembert. His correspondence with Leibnitz was published in two vols. 4to at the same places, in 1745. Of the two brothers, the elder was certainly the deeper and the more correct; the younger the quicker and the more elegant.

Another distinguished member of this family was DANIEL BERNOULLI, the second son of John who was born at Groningen, 9th February, 1700. He held first a chair of medicine, and afterwards of natural philosophy, to which was subsequently added one of metaphysics. He had published in 1721, during a residence at St. Petersburg, his first work, entitled "Exercitationes Mathematicæ." His succeeding essays on mechanics were the first in which motion is decomposed into that of translation and rotation. He afterwards entered into the valuable and useful theory of compound oscillations. Daniel Bernoulli gained or divided the prize of the Academy of Sciences ten times; once (in 1734) in company with his father, on the question of the physical cause of the smallness of the planetary inclinations, by which he excited jealousy in a quarter from whence admiration should have been most certain. In 1740 he shared with Euler and Maclaurin the prize for a dissertation on the tides; and their three memoirs contain all that was done on the theory of that subject between the writings of Newton and those of Laplace. In 1748 he succeeded his father as member of the Academy of Sciences, in which he was succeeded by his brother John; so that for more than ninety years the foreign list of that body always contained a Bernoulli. Daniel Bernoulli was found dead in his bed by his servant, 17th March, 1782. Several other members of this family were similarly distinguished in mathematics, especially the sons of John Bernoulli, brother of the great Daniel. One of these, John Bernoulli, died in 1807, since which time the family has not been famous.

BEROE. See CTEROPHORA.

BEROSUS (Bar-Oscas, i.e. "son of Oseas"), priest of the temple of Bel at Babylon in the time of Ptolemy Philadelphus, is believed to have been born in the latter part of the reign of Alexander the Great. He wrote a history of Babylonia, which has been long lost, though considerable fragments of it are preserved in the works of Josephus, Syncellus, and Eusebius, the early Christian fathers, and other ancient authors. They were collected by Scaliger at the end of his "De Emendatione Temporum," by Fabricius, &c. The best edition is the modern one by Richter (8vo, Leipzig, 1825). They are of the utmost importance in the study of ancient BABYLONIA, and the dynasties given by Berossus, once thought impossible, are found by recent discoveries to have a considerable historic basis. At the same time he lived too late, and relied too much on tradition, to be a sure guide in the more ancient Babylonian chronology.

BEROSUS is a genus of BEETLES belonging to the group CLAVICORNIA in the section PENTAMERA. They are English beetles inhabiting ponds, in which they may often be seen swimming in an inverted position. There are, however, other peculiarities in their mode of progression in the water which are common to the tribe. They feed upon vegetable substances. The common colouring of the species is dusky yellow, varied with markings of a

black or dark metallic bronze hue; their form is nearly oval, and the principal generic characters are eyes prominent, clypeus entire, antennæ nine-jointed, thorax narrower than the elytra.

BERRY is a term confined to such soft and succulent fruits as have their seeds lying loosely among pulp. The gooseberry and the currant are therefore genuine berries; but plums, rose-hips, haws, &c., in which the seeds do not lie among pulp, are excluded from the definition, although they are all comprehended under the same name. The strawberry, blackberry, and raspberry are not true berries; nor the yewberry, elder-berry, cranberry, or mulberry.

BERRY. See BACCA.

BERRY, DUKE AND DUCHESS OF. Charles Ferdinand, Duke de Berry, second son of the Comte d'Artois, and nephew of Louis XVIII., was born at Versailles on the 24th of January, 1778. On the 17th of June, 1816, he married Maria Carolina, daughter of the Queen of Naples. The duke was assassinated at the opera at Paris, on the 21st of February, 1820, being the last day of the carnival, by a political fanatic named Louvel. He left one daughter, Louise Marie Therese, born in 1815 and on the 29th September, 1820, his widow gave birth to a son, Henry, duke of Bordeaux, afterwards called the Count of Chambord, who has several times proclaimed himself as Henry V.—his pretensions being supported by a considerable party in France. In 1832 the widow endeavoured to get up an insurrection in La Vendée in favour of the elder branch of the Bourbons. She was, however, taken prisoner, and in the castle of Blaye gave birth to a daughter; whereupon she confessed that she had contracted a secret marriage with Count Palli, a Neapolitan nobleman. This strange issue of the affair led to the total decline of the little influence she once possessed; and on her recovery, in 1833, the French government sent her, with her child and suite, to Palermo.

BERRYA is a genus of plants belonging to the TRI-ACEÆ, and therefore allied to the lime-tree. There is only one species, *Berrya ammonilla*, a tree which grows in Ceylon, Australia, and the Philippines. The wood known as Triconalee wood is valuable, as it is light and yet strong, and is in great request by the Madrasers for making boats. In Ceylon it is employed for oil-casks, and no other wood is considered so well adapted for that purpose. The timber is exported in large quantities. The genus is easily distinguished from others of the order by its fruit, which is a six-winged capsule with three valves. The flowers are small, white, and very numerous.

BERSAGLIERI, the Italian name for a corps of riflemen or sharpshooters formed by General Della Marmora, during the remodeling of the Sardinian army under Victor Emmanuel. They fought bravely in the Crimean war, and took a prominent part in the battle of Tchernaya, 16th August, 1855. They maintained their reputation in the Italian war of 1859, and were afterwards largely employed by the Italian government in its efforts to suppress the brigandage prevailing in the Two Sicilies.

BERSEKIR, a furious hero of Norse mythology, whose ungovernable fury in battle has passed into a proverb. Thus Thomas Carlyle was fond of adjuring people "not to rouse the Berserkir rage that lies in this noble silent people—men that can be made very terrible" ("Past and Present"); alluding to the battle-fever that was said to seize the young Norsemen with an all-mastery madness like that caused by the passion of love in other races. Berserkir himself gained his name (the Bare-shirt) because he disdained armour; and his twelve sons, as brave and as irresistible as their father, were alike defenceless except for their unequalled valour. The phrase as used by modern writers signifies a furious onslaught, carrying away at once the attackers and those whom they attack in a rage whose blindness is often fatal to both. If the phrase were not

usually limited to Teutonic peoples, the French Revolution would be a striking example of the Berserkir rage.

BERTH, in nautical language, a word meaning room or space. To berth a ship's crew is to parcel out the room each man's hammock shall occupy. A ship's berth is the place she occupies when at anchor, including a small margin of water round her. The same name is given to the sleeping places in the cabins and steerages of vessels.

BERTHOLLE'TIA. See BRAZIL NUTS.

BER'VIE or **INVERBER'VIE**, a town in Kincairdineshire, Scotland, is situated on the coast, about 9 miles S. by W. from Stonehaven, 18 from Montrose by road, and at the terminus of a section of the North British Railway. The Water of Bervie, a small river, falls into the sea a little below the town, and forms a harbour for fishing boats at the village of Gourdon. A handsome bridge crosses the river. There is a church, a townhouse, and public hall. Population of the parish, 2106; of the parliamentary and royal burgh, 1094, mostly engaged in fishing. There are also some linen manufactures and a trade in corn. The charter of royal burgh was granted by David II. in 1362; and it is now governed by a provost, three bailies, and nine councillors. The parliamentary and municipal electors number 170. Bervie is included in the Montrose parliamentary district, which returns one member.

BER'WICK, JAMES FITZJAMES, DUKE OF, a natural son of James, duke of York, afterwards James II., by Arabella Churchill, sister of the great Duke of Marlborough, was born at Moulins in the Bourbonnais, 21st August, 1670. He was educated in France, and in 1686 served in the Austrian army at the siege of Buda. In 1687 he was created Duke of Berwick, and received the order of the Garter. Having returned to England after the campaign of 1687, he received several important military appointments.

On the breaking out of the revolution of 1688 the Duke of Berwick exerted himself to check its progress, and afterwards accompanied the king on his retirement to France. Having entered the French service, he was promoted to the rank of lieutenant-general in 1693. In the beginning of 1706 he was made a marshal of France, and was sent to command in Spain, where he had once before held a similar post. In 1707 he won the decisive battle of Almanza, against the Earl of Galway and the Marquis de las Minas, immediately after which Philip V. created him a grandee of the first class by the title of Duke of Liria and Xerica. Having served on the Rhine and in Flanders in 1708, he was sent in 1709 to command in Provence and Dauphiny. His successful defence of this frontier against the superior force of the Duke of Savoy is the chief foundation of his military fame, and has been considered a masterpiece of strategy. During the remainder of his life he was constantly employed in important commands, with the exception of the period from 1724 to 1733, during which he lived in retirement. He was killed by a cannon ball at the siege of Philippsburg, 12th June, 1734.

BER'WICK, NORTH, a royal burgh in Haddingtonshire, Scotland, is situated on the coast, at the mouth of the Frith of Forth. The town is 22 miles from Edinburgh, and 38½ from London by the Great Northern and North British Railways. It is contributory to the Haddington parliamentary district. Population of the parish in 1881, 2686; of the borough, 1698. It has a harbour, an active trade in corn, and is much frequented as a bathing-place; in fact it has become the most fashionable watering-place on the east coast; and its charming situation, noble views, and pleasant excursions alike by sea and land make the town increasingly popular. Large numbers of good houses have been erected for the accommodation of visitors, and there are also some good hotels, and a library and reading-room. The adjoining links afford admirable practice ground for the golf players. Near the town are the remains of

Tantallon Castle (graphically described in Sir W. Scott's "Marmion"), which formerly contained a fortress, in which many of the leading Covenanters were confined. A mile and a half from the shore at this point is the Bass Rock, about a mile in circuit, with cliffs rising steeply from the sea to the height of 313 feet, and it swarms with solan geese and other wild fowl. Behind the town rises the conical hill known as North Berwick Law, 612 feet above the sea-level.

BER'WICK-ON-TWEED, a seaport town of great historic interest, stands on the north bank of the Tweed, 58 miles south-east of Edinburgh by the North British, and 342 miles to the north of London by the Great Northern Railway. The town and its liberties, which extend about 3½ miles along the sea-coast, and about the same distance inland westwards, cover an area of about 8 square miles. It is included in that part of the county of Northumberland called Islandshire, which was constituted a county by itself in the reign of William IV., and determined to belong to England, and not to Scotland. A long-continued dispute was thus settled. Since the reign of Queen Mary, however, it has sent two members to the English House of Commons. The castle of Berwick was first ceded to England as part of the ransom of William the Lion in 1174, but it was restored by Cœur de Lion in 1189. The town of Berwick was strongly fortified in the latter part of the thirteenth century; its possession, therefore, was an important object, and it was frequently taken during the border wars by both the contending parties. Edward I. granted the town a charter, which was confirmed by his successors, and by various Acts of Parliament till the time of Elizabeth. James I. granted the town a new charter, conferring on the corporation the seigniorship of the town and about 3077 acres of land within the borough, which is not a very valuable property.

Berwick is still a walled town, but the present fortifications do not inclose so large a space as the ancient did. The existing walls were erected in the time of Elizabeth, are about 2 miles in circumference, and offer a pleasant promenade for the townspeople. Two small batteries defend the entrance to the harbour, and one commands the south bank of the Tweed. The town has four gates—the Scotch Gate, the Shore Gate, the Cowport Gate, and the Pier Gate. The course of the old walls may be still traced by their ruins; one of the old towers, called the Bell Tower, still remains almost entire.

Berwick was first made independent of both England and Scotland in the year 1551. The remains of the castle—built by Edward I., and in which he is said to have confined the Countess of Buchan for six years in a wooden cage—are near the railway station.

The town is in general well built, the streets are wide and airy. It is well lighted, and abundantly supplied with pure water, extensive works for the purpose having been completed in 1873. The parish church, dedicated to the Holy Trinity, is a commodious building. There is another church in the Castlegate, dedicated to the Virgin Mary. There are also chapels belonging to the Scotch Church, the United Presbyterian Church, the English Presbyterian Church, the Methodists, Independents, Baptists, and Roman Catholics. The chief places of education in the town are the school supported by the corporation for the children of burghers, and the free grammar-school. There is a good subscription library. The museum contains many valuable collections of antiquities and other objects found in the immediate neighbourhood. The guildhall, in which the meetings of the corporation and the courts of justice are held, is a handsome structure with a spire 150 feet high. Above the public rooms is the old gaol, and below them is held the market for meat, poultry, eggs, butter, &c. There are assembly rooms and a handsome corn exchange. The barracks, which afford accommodation for 700 men, are only occupied by the militia. The town has much improved

of late years by the planting of shrubs and evergreens in previously waste places, which has given it a very pleasant appearance. The bridge over the Tweed, consisting of fifteen arches, is 920 feet long, but only 17 wide. It was built in the reigns of James I. and Charles I., and is the property of the crown. Besides the old bridge the Tweed is crossed by a bridge and viaduct for the North British Railway, which is on twenty-eight arches, 126 feet high, and 2160 feet long, and was constructed by Stephenson. The quays and warehouses are extensive, and there is a patent slip for the repair of vessels. The principal business of the town arises from the fisheries, the corn markets, and the shipping trade. There are works for casting iron, for the manufacture of steam engines, and for all kinds of millwright articles. Dunask, diaper, sackings, carpets, hats, ropes, oil-cake, leather, &c., are manufactured in the town. The Berwickshire Naturalists' Club has its headquarters here. This society has made many valuable contributions to the natural history and archaeology of the border counties.

Berwick is a trading port; the export trade of the town consists principally of salmon, cod and other fish, corn, coals, ale, whisky, &c. The imports consist of timber, hemp, flax, iron, bones for manure, &c. The salmon fisheries in the Tweed, so productive prior to the new Fisheries Act, have fallen off in value; the fish when taken are packed in ice and sent to the London market.

The Tweed is navigable as far as the old bridge, beyond which the tide flows for about 7 miles. The harbour is defended by a pier half a mile in length, with a lighthouse at the head, projecting in a S.E. direction from the N. extremity of the river's mouth, and having two fixed lights. But notwithstanding the protection afforded by this barrier, and though there is 18 feet of water over the bar at ordinary and 26 feet at spring tides, the anchorage is very indifferent. The channel is very narrow; a large portion of the harbour, particularly on the Berwick side, dries at low water, and is rocky and incapable of being deepened; and after heavy rains the *freshes* run out with great violence. A new dock at Tweedmouth was built in 1876. In 1885 twenty-one vessels (1731 tons) were registered as belonging to the port; the entrances and clearances each average 450 (12,000 tons).

The borough consists of the parish of Berwick and the townships of Tweedmouth and Spittal, which are in Islandshire, a detached part of the county of Northumberland. The parliamentary and municipal limits are the same. The number of voters in 1884 was 2400. The population of the town of Berwick in 1881 was only 9179.

The municipal borough is governed by a mayor, bailiffs, and burgesses; it is divided into three wards, which return six aldermen and eighteen town councillors.

BERWICKSHIRE, situated on the south-eastern extremity of Scotland, is bounded on the E. by the German Ocean; on the N. by Haddingtonshire; on the W. by Roxburghshire and part of Edinburghshire; by the river Tweed and part of Roxburghshire on the S., and on the S.E. by the township of Berwick. Its most northern point lies in 55° 58' 30" N. lat., and its southern extremity, upon the Tweed, is in 55° 36' 30". Its length is about 31 miles, breadth 19½ miles, and area 302,951 acres. In 1881 the population comprised 16,937 males and 18,416 females; total, 35,353—a decrease of 1103 since 1871.

The surface of Berwickshire is hilly to the north and west, and slopes towards the south and east. The principal part of the county, seen from an eminence looking towards the Tweed, appears a level surface of fields, gardens, and trees, with towns, villages, and castles interspersed; it contains, however, several considerable elevations, and valleys watered by rivers and streamlets. There are eighteen hills in the county, chiefly belonging to the Lammermoor range, varying from 1248 to 1683 feet in

height. The coast consists of bold rocky precipices of considerable height, and is almost inaccessible except at Eyemouth and Coldingham bays, and at two or three other places, where sandy or gravel beaches at the foot of the rocks are accessible to fishing-boats. All the streams of Berwickshire, except the Eye and its tributaries, which fall into the sea at Eyemouth, and a few brooks which run into the sea at other places, flow into the Tweed. They consist of the Lauder, the Dye, the Whitadder, the Blackadder, and a few others, all small. Coldingham Loch has an area of 30 acres.

The roads in the county amount to nearly 700 miles in length, and there is also good railway accommodation.

Thin but useless seams of coal are found in the lowlands, a little limestone in various places, and clay-marl on the banks of the Whitadder and Blackadder. Gypsum is obtained in small quantities on the banks of the Whitadder. Shell-marl, which is found in several places, has been worked in the parish of Merton. Sandstone pervades the greater part of the county. Slate of indifferent quality has been worked near Lauder. Coarse pudding-stone, the Old Red Sandstone of geologists, occurs; the outer pier at Eyemouth harbour is built of it, and has long withstood, without apparent waste, the storms of the German Ocean. At Ordwell and other places attempts have been made to work some copper ore which has been found, but without success. Geologically the rocks of the county belong to the great Palæozoic period. The Silurian of the Southern Highlands reach up into Berwickshire, and cover a large tract of its surface. The equivalents of the Loughnyrd, or bottom rocks of the Silurian are seen at St. Abb's Head. Between Coldingham and Dunga Burn, near Cockburnspath, beautiful sections of Old Red Sandstone are seen on the coast. The Old Red is also well seen on the banks of the Whitadder at Prestonhaugh, near Duns, and in other localities. Carboniferous rocks cover a large area, and great masses of porphyritic trap occur in several places.

Climate, Soil, and Agriculture.—The climate of Berwickshire, from its geographical position and its proximity to the North Sea, is colder and more subject to sudden variations of temperature than the more inland and southern parts of the island. Yet the tables of health issued by the registrar-general show that it is actually one of the healthiest counties in Scotland. The harvest is in general three weeks later than in the counties south of the Humber; but the weather, on the whole, is drier than in the western counties of Scotland or the north-west of England, a very great advantage in an agricultural point of view. This is ascribed to the influence of two ranges of high land, the Cheviot Hills on the south, and the Lammermoor Hills on the north, which are connected by a range of lower hills on the west; these boundaries embrace a considerable extent of country, and include the basin of the Tweed between them and the sea. This basin contains many smaller elevations and dales, comprehending the merse or lowlands of Berwickshire, the detached northern part of the county palatine of Durham, and parts of the counties of Roxburgh and Selkirk. This tract of land shelves gradually from both sides towards the Tweed, which receives all its streams. It exhibits the most improved practical system of husbandry, by means of which the disadvantages of a northern climate have been overcome, and a soil but moderately fertile on the whole has been made to produce in perfection all the crops which were formerly confined to the more southern parts of the island.

The hilly districts of the county are bleak, cold, and unproductive, except on the lower slopes, where tolerable pastures are found, in which a hardy race of sheep and cattle are reared. In the midst of the hills there are several small valleys which are capable of cultivation, and the industry and perseverance of the inhabitants have converted many apparently barren moors and bogs into tolerably

productive arable land. The lowlands being more sheltered are of course more favourable to agriculture. The different kinds of soils, from the most compact clays and loams to the loosest sand and gravel, often occur in a very small compass, not unfrequently in the same field, if it be of any considerable extent. Most of the farms have land attached to them of every variety and quality, but on the whole the good soils prevail. The best soils are of a reddish colour, indicating the presence of oxide of iron in that state of oxidation in which it is most favourable to vegetation, and to which it is reduced when clay is burned which contains it. In every part of the county moors occur of greater or less extent, some of which are very poor. The thin black soil of the moors is of a loose porous nature, covering a subsoil of an impervious till or barren clay.

According to the agricultural returns issued in 1883 the total number of acres under cultivation in Berwickshire in that year was 194,500, or rather more than three-fifths of the entire area; only 35,000 acres being permanent pasture, meadow, or grass land, while 65,000 acres were devoted to corn, 34,000 to green crops, and 59,000 acres to clover and artificial grasses. Wheat was grown on 1000 acres, barley or bere on 21,500, oats on 37,000, turnips and swedes on 30,000, and potatoes on 3000. The live stock in the county in the same year consisted of 5000 horses, 14,000 head of cattle, 265,000 sheep, and 4000 pigs.

The farms in Berwickshire are generally of considerable size, from 500 to 1000 acres or more, and tenanted by men of good capital, who pay their rents punctually, and cultivate the land in a regular and scientific manner. Leases, generally for nineteen years, are almost universal; and this may be considered as one of the chief causes of the high state of cultivation in which the land is kept, and the extensive improvements which have been made by the tenants.

The farm-houses and buildings in this county, which were formerly clumsy and inconvenient, or mere cottages and hovels, are now mostly of a very superior order, and better adapted to the improved condition of the tenants and the more advanced state of agriculture. The cottages on most of the estates are also of a superior description.

There is a practice in Berwickshire, advantageous to all parties, of letting small portions of grass land to cottagers, mechanics, and small tradesmen in villages, which enables them to keep a cow without being encumbered with land. They pay a high rent for the grass, but this is the whole outlay. Several proprietors of cows frequently join to hire the feed of a field. The high rent remunerates the farmers, and the milk and butter of the cow are cheaply obtained by the owners. The butter markets are chiefly supplied by them. On the hills there is a coarse breed of cattle, which fatten well in the richer pastures of the valleys, and produce well-flavoured meat. The short-horned oxen from Yorkshire and Durham are in repute with the larger farmers for stall feeding. The Holderness and Ayrshire cows are preferred for the dairy and their calves. The farm horses are generally of a middle size, muscular and active, with clean legs without much hair on them, nearer allied in shape to the coach-horse than to the heavy English cart-horse. They are mostly bred in the counties of Ayr and Lanark, in the west. There are several sorts of sheep in Berwickshire. On the hills the black-faced Tweeddale are most common, being strong and hardy, and able to endure the severity of the climate. They are horned, and their wool is coarse. In the Merse and along the slopes of the hills the improved breeds have been introduced from the south, chiefly the Leicesters. The Cheviot breed of sheep, which is common in Roxburghshire, is also to be met with on the lower ranges of hills in Berwickshire. A very good breed has been produced by crossing the Cheviot with the Leicester. The Southdown breed also has been tried, and found to answer well; but it is not so general as the Leicester and the cross breeds above mentioned.

Many of the cattle fairs held at Berwick, Duns, Lauder, Coldstream, Greenlaw, and Oldhamstock are very extensive, and are a means of establishing great interchange between the live stock of England and that of Scotland.

Berwickshire contains thirty-one parishes and parts of two others. The county returns one member to the House of Commons—the number of electors in 1863 being 1846. The only royal burgh is Lauder, which is a member of the Haddington district of burghs.

Civil History and Antiquities.—At the time of the Roman invasion Berwickshire appears to have been occupied by the Otadini. It was afterwards invaded and peopled by bands of Saxons about the middle of the fifth century. This district was part of the kingdom of Northumberland until the year 1020, when it was ceded to Maelm II. by the Earl of Northumberland. About the eleventh century several Anglo-Saxon and Norman families settled in Berwickshire. Berwick then began to rise into importance, and became for centuries after a point of contention between the Scotch and the English. Greenlaw was made the county town by James VI. in November, 1600.

The antiquities of Berwickshire, as might be expected from its position as a border county, the scene of much predatory warfare, are interesting. There are tumuli, cairns, military stations, and ruined castles in almost every parish, and also the remains of some religious houses. One aisle remains of the priory church of Coldingham, one of the oldest structures in Scotland. Dryburgh Abbey, Edin's Hall (to the N.E. of Duns, on the N. slope of Cockburn Law), Cockburnspath Tower, East Castle, Karlston Tower, and Thirlstone Castle are some of the many antiquities of the county.

BERYL (from Persian *belur*, Latin *beryllus*) is a silicate of aluminium and beryllium, which crystallizes in the hexagonal or rhombohedral system. This mineral species occurs in hexagonal prisms without regular terminations, with a cleavage parallel to the basal plane, but indistinct; the fracture is conchoidal or uneven, the lustre is vitreous or resinous, and it is transparent or subtransparent. The hardness varies from 7·5 to 8, and the specific gravity from 2·65 to 2·75. The composition of a typical specimen—berylla, 14·0; alumina, 19·0; silica, 67·0. The colour is usually green, passing into blue and yellow, but great variations are produced by the quantity of oxide of iron present. The clear and transparent varieties are highly prized as gems; of these the *emerald* is the rich green (emerald green) variety, where the colour is probably due to chromium, of which it contains under 1 per cent. The *aquamarines* or precious beryls are those clear beryls of a sea-green, pale bluish, or bluish-green tint.

This mineral species may be distinguished from apatite by its greater hardness, and from green tourmaline by the crystalline form and hardness; the longitudinal striations of the prism are also valuable aids for distinguishing this species from other hexagonal minerals. Beryls have been found in the granites of Cornwall and Aberdeen, in gneiss in Banff, and in an altered limestone at Portsoy, Scotland. In Ireland they have been found in the granites of Mourne and Leinster, and in quartzite in Donegal. They are found in numerous other localities throughout the world. The finest emeralds come from a dolomite at Muzo, Colombia, but large specimens have been found in Siberia (in granite) and in Upper Egypt. Aquamarines come principally from Siberia, Hindustan, and Brazil. Very large crystals, but seldom transparent, have been obtained from North America.

Of remarkable emeralds one belonging to the Duke of Devonshire may be mentioned. It weighs nearly 9 oz., is a regular hexagonal prism 2½ inches long by about 2 inches in diameter. Another beautiful specimen, in the possession of Mr. Beresford-Hope, weighs 6 oz., and cost £500. A fine aquamarine belonging to Don Pedro weighs 225 oz., and one in the collection of Mr. Beresford-Hope weighs

8½ oz., and measures 4 inches in length; it is from the handle of King Joachim Murat's sword.

The value of these gems depends greatly on the colour and brilliancy, and on their being free from flaws.

BERYLLIUM. See GLUCINIUM.

BERYX is the typical genus of a family (Berycidae) of **ACANTHOPTERIGII**. The Berycidae are distinguished by their general aspect, their large strongly serrated scales, the existence of sharp furrows and streaks on the bones of the skull, face, or gill-covers, the serratures or spines of the opercular bones, and the general stoutness and acuteness or angularity of the spinous fin-rays. The ventral fins are *thoracic*, that is, placed below the pectoral fins; and they have more than five soft rays in addition to the spine. There are present eight *branchiostegals*, which are bony rays supporting a fringe or membrane which closes the gill-opening. The body is covered with ctenoid scales, which in the genus *Anoplogaster* are entirely absent, while in *Monocentris* they are very large and bony, forming a rigid plate of armour. The eyes are lateral, and in most of the genera are large. Teeth are found in the jaws and palate. The head is provided with large cavities, covered with thin skin for the secretion of mucus. Nearly all the members of this family are deep-sea fishes; the genera *Polynixia* and *Beryx* have been found in 345 fathoms. Another very rare genus, *Melamphaes*, must, to judge from the small size of its eyes, live at a still greater depth. *Holocentrum* and *Myripristis* are surface fishes, and are esteemed as food.

Many of the Berycidae have brilliant red and blue colours or golden tints. None enter the British seas, but they are ornaments of the intertropical seas. One (*Holocentrum longipinne*) is called the Welshman in Jamaica, the Red-man at St. Thomas', the Cardinal at St. Domingo, and the Squirrel in Carolina—names springing from its red tints.

The genus *Beryx* occurs in Madeira, the tropical Atlantic, and the seas of Japan and Australia. It has one dorsal fin with several spines, an anal with four spines, and a forked caudal. There are five conical teeth both on the palatine bones and the vomer.

In the genus *Myripristis* the air-bladder is divided by a contraction in two parts, the anterior of which is connected with the organ of hearing.

This family is found abundantly fossil. The genera *Beryx*, *Holocentrum*, and *Myripristis* are found in the formations of the Cretaceous period, together with many other genera now extinct.

BERZELIANITE or **BERZELINE**, a selenide of copper found in Sweden and the Hartz. It contains about 10 per cent. of selenium, and is a soft silver-white mineral that undergoes decomposition rapidly in the air.

BERZELIUS or **BERZEL, JOHAN JACOB**, an illustrious chemical philosopher, was born in 1779 at Välfersunda, near Linköping, in Sweden. He studied medicine and chemistry at Upsala. His first public appointment was that of junior professor of pharmacy and chemistry at Upsala. Here he introduced the method of teaching chemistry practically, whilst his predecessors had required their pupils to listen to lectures unillustrated by experiment. In 1815 he was made a knight of the order of Vasa, and in 1818 he became perpetual secretary to the Academy of Sciences, an office which he retained till his death. In 1821 he received the grand cross of the order of Vasa, and in 1835 he was called to the peerage with the title of baron. In the summer of 1848 he was attacked with paralysis, and on the 7th of August he breathed out his mighty spirit. His intellect was not in the least impaired by the approach of death, and up to the last we find him dictating his chemical ideas and suggesting important experiments. His discoveries—the result of half a century of uninterrupted and successful labour—are too many to be here fully enumerated. He discovered the elements selenium and thorium, and was the first to exhibit in the metallic

form calcium, barium, and columbium or tantalum, and to isolate silicon and zirconium. He it was who first gave modern analytical chemistry that exactness on which its value depends. He co-operated with Dalton in establishing the atomic theory, and determined the equivalents of the elements with great exactness. The blow-pipe, first introduced by Bergmann and Gahn, became in his hands an instrument of almost magic power. He was the author of numerous works, of which the best known is the "*Lärobok i Kemien*" (Text-book of Chemistry), an important work, which has been translated into every European language.

BESANÇON, once the capital of Franche-Comté, now of the department of Doubs in France, stands on the river Doubs in 47° 13' N. lat., 6° 2' E. lon., 250 miles S.E. from Paris, on a branch of the railway to Lyons. The population in 1882 was 57,067. The principal and more ancient part of the town is built on a peninsula formed by the river on its left bank; this is joined to the part on the opposite bank by a stone bridge, the foundations of which are of Roman construction. The isthmus of the peninsula consists of a mass of rock, on which the citadel is built. The citadel commands the approaches from the N., but is itself commanded by the hills on the E., S., and S.W. To defend the approaches in these directions several forts have been constructed, and these outworks altogether render Besançon a fortress of the first class, and one of the strongest military positions in Europe.

Besançon is a well-built town; the houses are all of stone, and two or three stories high. The streets are wide and regular, the squares spacious and ornamented with fountains. There is a fine promenade in the city formed out of the gardens of the Grandville Palace, and another of great extent called *Chamars (Campus Martins)*, which runs along the Doubs. The most remarkable edifices in the town are the Cathedral Church of St. Jean, which was built in the eleventh century, and is decorated with paintings by the best masters and with several fine sculptures; the churches of La Madeleine, St. Pierre, and St. François-Xavier, the hospital of St. Jacques, the palace and college built by Cardinal Grandville and his father, the town-house, the court-house (in which the parliament of the province formerly sat), the barracks, the theatre, and the public library, which is adorned with statues and contains 300,000 volumes, besides some valuable manuscripts. A passage cut through the rock on which the citadel stands, and called *la Porte Taillée*, is a Roman work, and formed part of an aqueduct by which pure water was conveyed to the town from Arcier, a distance of 5½ miles.

Besançon gives title to an archbishop, whose see consists of the departments of Doubs and Haute-Saône, and under whose ecclesiastical superintendence are the sees of Verdun, Belley, Saint-Dié, and Nancy. The High Court and the University Academy of Besançon exercise jurisdiction over the departments of Doubs, Haute-Saône, and Jura. In connection with the academy there are in the town a college, a school of medicine, and a faculty of arts. The town also possesses tribunals of first instance and of commerce, an ecclesiastical seminary, a museum of natural history, schools of artillery and design, an institution for deaf mutes, an academy of sciences and arts, and a museum containing antiques, paintings, &c., which were bequeathed by the architect Paris to his native city.

Besançon is a place of considerable manufacturing industry; its position on the Doubs, which is navigable, and on the canal which unites the Rhone and the Rhine, makes it the centre of an important trade. The chief manufacture is that of the works of watches and clocks, in which several thousand persons are employed, and in which industry the town has become a rival to Geneva, producing upwards of 500,000 watches annually. Hosiery, coarse woollens and cottons, carpets, wall-paper, hardware, stoves, liqueurs, and artificial flowers are manufactured. There are

also iron-foundries, china-works, tanneries, several large breweries, and establishments for bleaching wax. The trade of the town consists in its industrial products, and in wine, brandy, broadcloth, groceries, iron, and coal.

Besaçon is a very ancient city; it was called by the Romans *Vesontio*, of which the modern name is a slight corruption. Julius Cæsar, who occupied it B.C. 56, in order to protect the Séquani, whose capital it was, from the Germans under Ariovistus, speaks of it as one of the largest and strongest cities of Gaul. The city was greatly improved under Aurelian, in whose honour a triumphal arch was erected, which, though much mutilated, still exists. Whilst under the Roman dominion Besaçon was the seat of one of the most famous schools in Gaul. Near the town are the ruins of the ancient amphitheatre, which must have been able to hold 20,000 spectators. After being many times besieged, stormed, demolished, and rebuilt, from the time of Attila till the fifteenth century, the city then fell to Austria, by which power it was ceded to Spain at the treaty of Münster. Louis XIV. captured it in 1660, and since then it has belonged to France. In 1814 and 1815 it was invested and bombarded by the allies, and in the war of 1870-71 it formed an important position in the movements of the French army.

BESSARABIA, the most south-westerly province of the Russian empire, consists of those portions of Turkey lying between the Dniester and the Pruth, which were wrested from the Turks by the treaty of Bucharest in 1812; they previously formed the north-eastern part of Moldavia and the Budjak, or Bessarabia proper, and now constitute under the Russians one of the provinces included in what is designated "the Southern Region."

The Russian province of Bessarabia contains an area of 17,251 English square miles; it extends between 44° 45' and 48° 40' N. lat., and 26° 35' and 30° 30' E. lon. It is bounded on the N.E. and E. by the Russian provinces of Podolia and Cherson, from which it is separated by the Dniester; on the S. by the Danube, which separates it from the Dobrudscha; on the W. by the line of the Pruth, by which it is separated from Roumania; and on the N.W. by that part of the kingdom of Austrian Galicia called the Buckowine. By the treaty of Paris of 1856 a slight rectification of its boundaries took place to exclude Russia from any control of the navigation of the Danube; but the territory then ceded by Russia was restored to her by the treaty of Berlin in 1878.

If Bessarabia were properly cultivated there are few countries which would surpass it in productiveness. The larger portion of it, which lies to the north, is a succession of gently undulating country, with a deep layer of fertile soil. The southern part, or Budjak, is less favourable for culture. The principal river is the Danube, which borders it on the south from the mouth of the Pruth to the Black Sea, and includes the three channels already mentioned, which form the large islands of Zatoka, Tsheral, and Leti, and several minor ones. The other rivers are the Pruth, the Jalpuch, Kogalnik, the Sarata, the Dniester, and others of less importance. There are several small lakes in the southern half of the province, some of fresh water and some of salt.

The climate is in general mild, salubrious, and agreeable; the grape, the finer kinds of fruit, and melons grow in the open air. The steppes of the Budjak, however, having no shelter from trees or woods, are sometimes so hot in summer that the grass withers; yet the vicinity of the Carpathians and the more remote range of the Balkan fortunately prevent this extreme heat from being of long duration in ordinary seasons. The winter is piercingly cold in those districts, which are unprotected by the highlands or mountains.

Since Bessarabia has been incorporated with the Russian dominions the cultivation of the soil has been rapidly im-

proving, and numerous colonies have been settled in the heart of the country. Notwithstanding these immigrations, very extensive districts of productive land remain either uncultivated or are only used as pasture for cattle and sheep. The descriptions of grain raised in Bessarabia are wheat, barley, millet, and particularly kukuruz or maize, the meal of which is substituted for wheaten flour. The corn-lands, from the facilities for export afforded by the ports of Rénny and Ismail, are situated chiefly in that direction; but, in general, the want of markets for grain discourages cultivation. The vine, flax, hemp, tobacco, and numerous fruits and vegetables are cultivated. The northern districts produce fine forest trees suitable for shipbuilding. The great resource of the province is, however, the rearing of horned cattle, horses, and sheep; for the steppes of the Budjak abound in excellent grass, and the northern districts in rich meadows and pastures. Private individuals maintain studs of great extent, and the districts of Yassy and Khotin are celebrated for the number of horses they rear no less than the excellence of the breeds. The buffalo, and many varieties of game, birds, and fish are among the animals of the country.

The principal mineral product of this province is salt, which is obtained in considerable quantities from the lakes in the Budjak. The province also yields saltpetre, coal, bay-salt, Glauber salt, alabaster, marble, and lime.

Bessarabia is divided into six districts—Khotin, the capital of which is the town and fortress of the same name; Yassy, chief town Beltzy; Orkhei or Kisheneff, chief town Kisheneff; Bender, chief town of that name on the Dniester; Akerman or Akkyerman, the chief town of which now bears the same name, and was called Alba Julia in the time of the Romans; and Ismail, whose capital of the same name lies on the Kile channel. The population of the whole province, according to the latest official estimate, was 1,314,191. It comprises Moldavians, Russians, Greeks, Jews, Armenians, and colonists. The chief inhabitants are the Moldavians. Their language is the Moldavian, a singular medley of a Slavonian dialect with Latin and Italian; it is full of diphthongs, and has hence acquired a certain degree of richness and euphony. They profess the orthodox, or Russo-Greek faith, and are a tall, handsome, slim race of men. The women have the character of being much more industrious than the men. The Russians are the chief artisans, and the Greeks the chief dealers. There is a moderate commerce in and out of the province, but very few manufactures. The towns and villages are for the most part dirty and comfortless.

BESSEL, FRIEDRICH WILHELM, one of the first of modern astronomers, was born at Minden, 22nd July, 1784. In 1810 he published an important work containing his researches on the orbit of the great comet of 1807, which gained him the Lalande medal of the Paris Academy of Sciences. The same year he was appointed by the King of Prussia director of a new observatory at Königsberg, where he superintended the erection and mounting of the instruments. Here he remained, diligently pursuing his astronomical labours, until his death, which took place at the observatory, 7th March, 1846. Among the more important of his contributions to the science of astronomy may be enumerated the publication, in 1818, of the "*Fundamenta Astronomiæ*," founded on the Greenwich observations of Bradley, which by eleven years' labour he reduced to order, carefully determined the errors of Bradley's comparatively imperfect instruments, and eliminated from these works those fundamental and universal constants the application of which to any crude observation enables the astronomer to state exactly what the place of the observed object would be, had it been observed not from the moving platform of the earth, but from an invariable point in the centre of the planetary system. This work, of the highest value to astronomers, was completed by the

"*Tabulæ Regionumtanae*," issued in 1830. He was also the author of a work on the "Seconds Pendulum" for Berlin, of "Astronomical Researches" (in two volumes, 1841-42), of some popular lectures on astronomy which were published after his death, and of nearly 200 separate papers on astronomical subjects. By a series of patient observations extending over three years he obtained the annual parallax of the fixed star, 61 Cygni. He proposed as the best of all modes of fixing the latitude, observation by a telescope sweeping an arc at right angles to the meridian, and determined the mass of Saturn's rings through their disturbing effect on the satellite Titan. He also prepared a catalogue of stars, extending to the ninth magnitude within the zone from 15° N. to 15° S. declination, making over 75,000 observations for this purpose. Concerning the value of his labours a competent British critic has observed, that "no man in recent times among the cultivators of astronomy has achieved a surer immortality than Bessel's; not a step can be taken henceforth in advance unless it departs from some point that has been fixed by this most remarkable person."

BESSEMER STEEL. See **IRON**.

BETCH'WORTH, a village of Surrey, 5 miles from Reigate, and 26 from London by the South-eastern Railway, is pleasantly situated in the valley of the Mole. The church, partly rebuilt in 1810, contains some interesting memorials. At Betchworth Park, a spot of peculiar beauty, are the ruins of a castellated mansion of the fifteenth century, occupying an elevated knoll on the western bank of the Mole.

BETEL. See **ARECA**, **CHAVICA**.

BETH'ANY, about 3 miles from Jerusalem, at the foot of Mount Olivet. The whole importance of the place is derived from New Testament history, it being never mentioned in the Old Testament or the Apocrypha. It was the residence of Lazarus and his sisters, and a favourite retreat of Christ. On the site of Bethany there is now a village inhabited by Arabs called "Lazariyeh," or the "Town of Lazarus," where what are said to be the house of Simon the leper and the grave of Lazarus are shown. The appearance of the latter certainly corresponds with what is said about it in Scripture.

BETHES'DA was the name of a tank or pool surrounded by five halls or porches near the Sheep-gate, Jerusalem. Tradition now points out this tank or pool near the gate of St. Stephen, at the east side of the mountain on which the temple stood, where there is an empty tank 120 feet long and 40 feet broad, walled round with stones, but without water.

BETH'LEHEM, a town in the United States of North America, on the north bank of the river Lehigh, is 48 miles N.W. from Philadelphia. It was settled by the Moravians under Count Zinzendorf in 1741. It is a neatly-built town, and contains a large church of Gothic architecture. There is a bridge over the Lehigh 400 feet long, and the Lehigh canal passes by the side of the river through the lower part of the town. The population in 1880 was 4512, chiefly Moravians.

BETH'LEHEM HOSPITAL, or the Hospital of St. Mary, Bethlehem, was originally founded in 1247 as a religious house by Simon Fitz Mary, a citizen of London, upon lands in the parish of St. Botolph Without, Bishopsgate. After the dissolution of monasteries it was granted in 1547 to the mayor, commonalty, and citizens of London as an hospital for lunatics, and became commonly known as "Bedlam." The enlargement of the establishment having become necessary, while the original neighbourhood had become close and confined, the new hospital of Bethlehem, as it was then called, was commenced in 1675 on a plot of ground near London Wall. This structure, however, in turn gave way to a fitter building erected in 1814 in a commodious situation south of the Thames.

BETH'LEHEM-JUDAH, EPHRATH, or EPH-RATAH, so called to distinguish it from Bethlehem of Zebulun (Jos. xix. 15), stands on a rising-ground 6 miles S.E. of Jerusalem. It never was a large town. The earlier name of Bethlehem was Ephrath (Gen. xxxv. 16, 19; xlviii. 7). It was fortified by Rehoboam (2 Chron. xi. 5, 6). It was the scene of Rachel's death and burial (Gen. xxxv. 19), the native place of Samuel's father (1 Sam. i. 1), the residence of Boaz and Ruth (Ruth iv. 11), and the birth-place of David (1 Sam. xvii. 12). It was once captured by the Philistines (2 Sam. xxiii. 14). The house of Boaz, the patrimony of David, was bestowed by him on Chimham the Gileadite, and became the khan or inn on the great road to Egypt. It was the last rallying-point of the remnant of Judah after the invasion of Nebuchadnezzar (Jer. xli. 17), and the birthplace of our Lord (Luke ii. 11). The pious Empress Helena built a handsome church in the form of a cross over the spot in which Christ is supposed to have been born, which remains to this day. This church was much embellished by her son Constantine.

A monastery of great extent accommodates Greek, Latin, and Armenian monks, who have the charge of guarding the Chapel of the Nativity, which is a vast grotto cut out of the rock and paved with marble. It contains three altars constantly lighted up with silver lamps. One of these is said to occupy the spot on which Christ was born, the second the place of the manger, and the third the space in which took place the adoration of the Magi. Population about 3000, most of whom are Christians, and who are chiefly employed in the manufacture of beads, crucifixes, and rosaries, which are vended to pilgrims who resort to the village as a sacred shrine.

BÉTHUNE takes its name from a strongly-fortified town in France in the department of Pas de Calais, with a college and 9076 inhabitants, situated on a rock above the Brett 18 miles N. by W. from Arras. The town is pretty well built, and possesses a large square, the centre of which is occupied by an old tower of odd construction. The town-hall, which stands on one side of this square, and the principal (Gothic) church, remarkable for the light elegance of its nave, are the only buildings of importance. Béthune has a public library; manufactures of soap, oil, lawn and woollen cloth; salt refineries, beet-root sugar factories, tanneries, and a gin distillery. The trade of the town in its industrial products, and in corn, wine, brandy, oleaginous seeds, cheese, charcoal, iron, pottery, &c., is much facilitated by the Lave and Bassée canals, which here meet in a common basin. The first artesian wells were bored in Béthune and its neighbourhood.

BETHYL'US is a genus of HYMENOPTERA belonging to the group PEMPIDOR. The insects of this genus are little four-winged flies, remarkable for their large depressed heads; they are not very unlike ants in their appearance, and are found in flowers and sometimes on the leaves of shrubs, to which they resort in search of small caterpillars, which they store up in cells to nourish their future progeny. They are chiefly found in dry and sandy situations.

BETJUA'NA. See **BACHUANA**.

BETON'ICA or BET'ONY. See **STACHYS**.

BETROTH'AL or BETROTE'MENT means that a man and woman pledge their *troth* or *truth* to one another to enter at some convenient time, fixed or undetermined, into the state of matrimony. In the law of Moses there are provisions respecting the state of the virgin who is betrothed. In the Roman law the "sponsalia" or betrothment is defined to be a "promise of a future marriage." Accordingly "sponsa" signifies a woman promised in marriage, and "sponsus" a man who is engaged to marry. Sponsalia could take place after the parties were seven years of age. ("Digest," 23, tit. i.) In England formal engagements of this kind were usual down to the time of the Reformation.

The northern nations, including the northern English and the Scotch, called this ceremony by the expressive term *hand-fasting*, or *hand-fastning*. In Germany the parties are called respectively "brant" and "bräutigam" (bride and bridegroom) from the time of the betrothment (verlobung) until the marriage; and it is usual to advertise the betrothment in newspapers, both of the town of the bride and of that of the bridegroom.

BETTA is a genus of fishes of the order ACANTHOPTERYGII, and belongs to the same family as the climbing perch or ANABAS. A species of this genus (*Betta pugnax*) is domesticated by the Siamese and trained to fight. An excellent account of the habits of this fish is given by Dr. Cantor in his "Catalogue of Malayan Fishes." "When the fish is in a state of quiet, with the fins at rest, the dull colours present nothing remarkable. But if two are brought within sight of each other, or if one sees its own image in a looking-glass, the little creature becomes suddenly excited, the raised fins and the whole body shine with metallic colours of dazzling beauty, while the projected gill membrane, waving like a black frill round the throat, adds something grotesque to the general appearance. In this state of irritation it makes repeated darts at its real or reflected antagonist. But the fish, when out of each other's sight, instantly become quiet. This description of their actions was drawn up in 1840, at Singapore, by a gentleman who had received a present of several from the King of Siam. They were kept singly in glasses of water, fed with the larvae of mosquitoes, and had thus lived many months. The Siamese are as infatuated with combats of these fishes as the Malays are with their cock fights, and stake considerable sums, and sometimes their liberty and that of their families, on the issue. The license to exhibit fish-fights is farmed, and yields a considerable revenue to the crown. The species abounds in the rivulets at the foot of hills of Penang. The inhabitants name it 'Pla-Kat,' or the 'Fighting-fish,' but the kind kept especially for fighting is an artificial variety cultivated for the purpose."

In the genus *Betta* the dorsal fin is short and without any pungent spine; the ventral fin has five soft rays, the outer being produced; the anal fin is long. The line of perforated scales which runs along the side of bony fishes is interrupted or altogether wanting in this family. As in *Anabas*, the gills are constructed for retaining water.

BETTING or **WAGERING**, a practice too well known to need definition, which has come down from the earliest times, is now extensively prevalent throughout civilized society, and more especially so wherever the English language is spoken. Every kind of sport is made a means of betting, but that of horse-racing is by far the most popular, and the amount of money which changes hands over some of the more important races reaches an enormous sum. The selfishness, folly, and mischief of this habit are too apparent to require exposition—the ever-recurring cases of embezzlement where men have appropriated money intrusted to them for this purpose, would of themselves be sufficient to point these out; but the custom is so widely spread and so generally sanctioned by society as to be beyond the power of any legislative enactment which might be passed for its suppression. Something has been done, however, towards the regulation of public betting, and houses or rooms opened for that purpose were in 1853 declared by statute (16 & 17 Vict. c. 119) to be public nuisances, and persons keeping them are liable to a penalty of £30 and costs, or to imprisonment not exceeding two months. This Act having been evaded, a further enactment was made in 1874 (37 Vict. c. 15) whereby persons who published any advertisement of a betting-house, or who conducted one by means of the post-office, were also rendered liable to a penalty of £30 and costs, or two months' imprisonment with or without hard labour. Another Act (the 36 & 37 Vict. c. 38) also provides that

any person playing or betting by way of wagering or gaming in any street, road, highway, or other open and public place, at or with any table or instrument of gaming, or any coin, card, token, or other article used as an instrument of gaming, shall be deemed a rogue and a vagabond, and may be punished accordingly, or in lieu of such punishment fined £2 for first offence, and £5 for any second or subsequent offence. See GAMING.

BETUL' (*Baitool*), a district in the Chief Commissionership of the Central Provinces of British India, lying between 21° 20' and 22° 35' N. lat., and 77° 13' and 78° 35' E. lon. It is bounded on the N. and W. by Hoshangabad district, on the E. by Chindwara, while of its southern border the eastern half touches Nagpur district, and the western half Berar. The area is 4118 square miles, and the population 285,000. The administrative headquarters are at Badnur.

Though essentially a highland country, with a mean elevation of 2000 feet above the sea, this district divides itself naturally into several portions, distinguished by their appearance, their soil, and their geological formation. Betul, the chief town, occupies the centre of the district. It lies in a level basin of rich land composed of a deep alluvial deposit entirely devoid of black soil. This tract is almost entirely under cultivation, being studded with numerous and thriving village communities. Through it flow the perennial streams of the Machna and Samuna, while on every side but the west steep ridges of igneous rocks shut it in. Westward the Tapti winds through a deep valley clothed with dense jungle. Below this a fertile rolling plateau of basaltic formation spreads over the southern part of the district, with the sacred town of Multai at its highest point, till it is lost in the wild and broken line of mountains which parts Betul from the low country beyond. Here and there fruitful valleys lie between the successive ridges of trap-rock, and in a few places the shallow soil on the tops of the hills has been turned to account; but most of the land is barren. Trees rarely occur, and the southern face of the district is bare and desolate. Above the town of Betul extends a tract of poor land thinly inhabited and meagerly cultivated, ending in the main chain of the Satpura Hills, beyond which a considerable fall takes place in the general level of the country. North, again, lies an irregular plain of sandstone formation, well wooded, and presenting in places the appearance of a vast park; but the soil is mostly unfit for the plough, and barely rewards the labours of the few cultivators. To the extreme north the district is bounded by a line of mountains rising sheer out of the great plain of the Narbudda (Nerbudda). The western portion of this region is a mass of hill and jungle, inhabited almost wholly by Gonds and Kurkush. Forests cover a large extent of country. Five of the best timber-bearing tracts, with a total area of 495 square miles, have been reserved by the government. They contain abundance of young teak, some magnificent saij (*Pentaptera glabra*), kawa (*Pentaptera argyrea*), shisham (*Dalbergia latifolia*), salai (*Boswellia thurifera*), and other excellent timber. The unreserved state forests extend over 952 square miles, and are under the management of the deputy-commissioner.

During the greater part of the year Europeans find the climate of Betul agreeable and not unhealthy. The elevation of the country and the neighbourhood of extensive forests temper the great heat of the sun, and even in the hot season the nights are invariably cool and pleasant. During the rains the climate is sometimes cold and raw, thick clouds and mist enveloping the sky for many days together. By far the most fatal complaint is fever, to which cause are generally due about 80 per cent. of the deaths throughout the district. Dysentery also, and other bowel complaints, constantly prove fatal.

By the treaty of 1826 Betul district was formally

incorporated with the British possessions, and is now administered by a deputy-commissioner.

BETULA. See **BURCH**.

BETULEÆ is a group composed of the two genera of trees, *Betula* and *Alnus*. By some botanists it is looked upon as forming an order, but according to the latest authority, the "Genera Plantarum" of Bentham and Hooker, this group is classed as a tribe of the order **CUPULIFERÆ**. The flowers are arranged in catkins. In the female flowers there are two styles, a two-celled ovary, each cell with one ovule; but in the fruit, a small nut, there is only one cell with a single seed. See **BURCH**, **ALDER**.

BETUWE, a large and fertile district of Holland, inclosed between the Waal, the Rhine, and the Lek, which joins the Rhine to the Waal, and thus forms an island that occupies part of the country of the ancient **BATAVI**. The length of the district of Betuwe is nearly 60 miles from E. to W. Its breadth is very irregular; between Vianen and Gorkum it is about 13 miles. The principal towns of Betuwe are Gorkum and Thiel. The river Linghe, which falls into the Waal at Gorkum, crosses Betuwe through the greater part of its length.

BEVEL is the name applied both to the oblique angle formed by two surfaces which meet at either more or less than a right angle, and to the instrument employed by carpenters and joiners for taking and transferring such angles. The common carpenter's bevel consists of a straight wooden stock mortised at one end to receive a thin blade, which is usually formed of steel, and attached to the stock by a pin in such a way that it may be turned to any required angle, and secured by a tightening screw. Where many articles have to be worked to the same angle, it is desirable to use a fixed bevel made to the required angle, especially where one or both of the limbs are curved; and when the interior angle of the bevel is that used by the workman, such an instrument is sometimes called a "joint-hook."

BEVELAND, a district of the province of Zeeland in the kingdom of Holland, consisting of the islands of Noord Beveland and Zuid or South Beveland, with a smaller island called Wolfaartsdijk situated between the two. Zuid Beveland is by far the largest and the finest of the three islands; its length is 25 miles from E. to W., and its greatest breadth is about 9 miles from N. to S. It produces corn, abundance of fruit, vegetables, and madder. The capital, Goes, which has 5600 inhabitants, is situated on the north coast of Zuid Beveland; there are besides many villages scattered about the island. Noord Beveland is a much poorer country, being low and marshy; its length is about 13 miles, and its greatest breadth about 4 miles. It has a few villages, the principal of which are Wissenkerke and Kortjyn. Wolfaartsdijk is a small fertile island which contains two villages.

BEVERLEY, a market-town and municipal borough, and the capital of the East Riding of Yorkshire, is 181½ miles N. by W. from London, and 9 miles N. by W. from Hull. It is situated at the base of the Wolds, and about a mile from the river Hull, and is a station on the Hull, Beverley, and Bridlington branch of the North-eastern Railway. It is divided into two wards, and is governed by six aldermen (one of whom is mayor) and eighteen councillors. For sanitary purposes the town is under a local board of health consisting of twenty-four members. The town was formerly a parliamentary borough, and returned two members to the House of Commons; but in 1870 it was disfranchised for the bribery which had been practised at the general election in 1868, and on several previous occasions. The population of the municipal borough and liberties in 1881 was 11,425.

The ancient history of Beverley is obscure. No Roman remains have been discovered. There was a monastery there in the eighth century, which King Athelstan con-

verted into a college, and a charter was granted by him to the town of Beverley about the year 938. The charter of Athelstan was confirmed by succeeding kings, or similar ones were granted. It appears that Beverley was a manufacturing town at an early period, and it is mentioned as one of the towns which might "freely buy and sell dyed cloth." In the time of Edward III. Hull had become a town of increasing importance, and was an impediment to the advancement of Beverley, as it offered greater facilities for domestic and foreign commerce by its situation at the junction of the river Hull with the Humber, and the pretensions of Beverley as a port became disregarded. To raise the declining commerce of Beverley a charter incorporating the town was procured in the fifteenth year of Elizabeth, and the right to send two burgesses to represent the burgesses in Parliament was acknowledged. This right the men of Beverley had exercised as early as the time of Edward I., but for a long series of years they had ceased to avail themselves of such privilege. The last charter, previous to the Municipal Reform Act, was that granted in the first year of James II.

Beverley is a town of great length, considering its population, being considerably more than a mile from its commencement on the road from Hull to its outskirts on the Driffield road. The principal street is wide and airy; the market-place, which comprises an area of nearly 4 acres, is ornamented with an octangular market-cross. In a room of the North Bar, a gate of the time of Edward III., Charles I. is said to have lodged. Several good shops and houses have been built in recent years, and some improvements effected in the sanitary arrangements of the town. Beverley is the centre of an important agricultural district, and has a large trade in corn and general farm produce. Many of the inhabitants are engaged in tanning, and there are some extensive agricultural implement manufactories. The other industrial establishments are whitening factories, artificial manure works, corn, bone, and linseed mills, and several breweries and malt-houses. There is also a good trade in cattle, coal, and timber. The finest object in Beverley is the collegiate Church of St. John, commonly called the Minster Church, which in size and beauty of architecture is superior to many cathedrals. This edifice has been built at different periods, and exhibits various styles of Gothic architecture. The principal window at the east end is similar to that of York. The entrance to the nave on the north side is by a porch of exquisite beauty, with a pannelled front which is perhaps unequalled. The west front is described by Rickman as being the finest of its style in England. He says that "what the west front of York is to the decorated, so is this to the perpendicular style, with this addition, that in this front nothing but one style is seen—all is harmonious." The length from east to west is 334 feet, the length of the transept 167 feet, the height of the nave 67 feet, the height of the two west towers 200 feet, and the height of the central tower above the vaulted roof of the nave 40 feet. Between the east transept and the choir is a very beautiful Percy shrine. Near the altar is the seat of refuge or sanctuary for criminals, the privilege having been given by Athelstan. The collegiate establishment was dissolved in the first year of Edward VI., and its revenues were then appropriated by the crown.

St. Mary's Church is an exceedingly handsome and spacious Gothic building, with an elegant tower at the intersection of the nave and transept. It is in various styles, chiefly, however, Norman and Early English. The Independents, Wesleyan Methodists, Church Methodists, Primitive Methodists, Baptists, and Quakers have places of worship in Beverley. The grammar-school is a foundation of great antiquity. An ancient charity endowed by Lady Archer for the relief of decayed tradesmen having become useless, the Court of Chancery, on the petition of the

inhabitants, sanctioned in 1854 a scheme for establishing in its stead a new endowed school. It was opened in 1861, and is called the Beverley Foundation School. The other institutions of Beverley are a savings bank, a dispensary, a news-room, and a mechanics' institute. There are almshouses, hospitals for widows and old men, and numerous gifts and charities. The East Riding of Yorkshire Lunatic Asylum was opened near the town in 1872. The freemen's pastures, comprising 1200 acres of land, are a very pleasant resort. In one portion is the racecourse.

BEWDLEY, a market-town, municipal borough, and parliamentary borough in Worcestershire, is situated on an alluvial plain on the western bank of the Severn, 128 miles N.W. from London by the Great Western Railway, and 13 miles N. by W. from Worcester. It can also be approached by the North-western and South Midland lines. The town was formerly within the jurisdiction of the marches of Wales, but was included in the county of Worcester by an Act 34 & 35 Henry VIII. c. 26. Leland says—"The town is sett on the syde of a hill, so comely a man cannot wish to see a towne better, . . . and because that the plott of it seemed fayre to the lookers, it hath a French name, Beaudley, quasi *bellus locus*." Leland means to say that the town was originally called *Beaulieu* ("beautiful place"), which had become Beaudley by corrupt pronunciation.

Bewdley is connected by a handsome stone bridge over the Severn with the suburb of Wribbenhall, which is included in the parliamentary borough, together with the other hamlets of Hoarstone, Blackstone, Netherton, and Lower Mitton-with-Lieckhill. The parliamentary borough returns one member to the House of Commons. Its population in 1881 was 8677, and the number of voters in 1883 was 1280. Wribbenhall is not included in the municipal borough, which is governed under the Municipal Reform Act by four aldermen and twelve councillors, and had in 1881 a population of 3088, a large proportion of whom are Dissenters, who have several places of worship in the town. The church is a chapel of ease under that of Ribbesford, in which parish Bewdley is situated. The town-hall is a handsome and commodious building. There is a free grammar-school, some other free schools, and several charities for the use of the poor.

The streets are wide and clean, and the town has a good supply of water and is well drained. Bewdley Park, in the immediate vicinity, incloses about 400 acres, divided into pastures, arable land, waste, and woodlands. Through this park are some beautiful walks, particularly that from Bewdley to Ribbesford, which is nearly a mile long, through fine groves of elm, oak, and sycamore. The scenery around is varied and picturesque.

There are no manufactures of importance, but the town contains some small salt-works, malt-houses, and tanneries, and some horn combs and brass goods are made.

BEWICK, THOMAS, the reviver of wood-engraving in England, was born at Cherryburn, near Newcastle-upon-Tyne, in 1753. Showing an early taste for art, he was apprenticed to Mr. Ralph Beilby, of Newcastle, who engraved door-plates, clock-faces, and occasionally copper-plates for printing. Dr. (then Mr.) Hutton consulted Beilby respecting some diagrams for his treatise on Mensuration, and the result was that his ingenious apprentice was employed to cut them on wood. This was about 1768, and his success was such as to lead to his further employment. Advancing to works of higher pretensions, Bewick obtained a premium from the Society of Arts in 1776, for a cut which subsequently appeared among others in an illustrated edition of Gay's "*Fables*," published in 1779. A volume of "*Select Fables*," illustrated in like manner, appeared in 1784; after which, in partnership with his former master, and assisted by his brother John, he commenced a "*History of Quadrupeds*," which was published in 1790. The cuts to this work were very superior to any-

thing of the kind that had before appeared. Illustrated editions of Goldsmith's "*Traveller*" and "*Deserted Village*," Parnell's "*Hermite*," and Somerville's "*Chase*" followed; the latter being the last work on which John Bewick, who died in 1795, aged thirty-five, was engaged. In 1797 appeared the first volume of the "*History of British Birds*," which was completed in 1804, and is considered Bewick's best work. He died, much respected, 8th November, 1828, aged seventy-five, leaving several pupils who distinguished themselves in his peculiar branch of art.

Nothing is more characteristic of Bewick's art than its originality and directness. He saw nature for himself—never through the eyes of some bygone master. "*Art for art's sake*" was never a motto of Bewick's; truth to the thing represented was his first and main aim; and, as he says, "*the sole stimulant was the pleasure I derived from imitating natural objects.*" Thus it comes that his style and methods possess the most admirable directness, the most complete and instinctive adaptation of means to end. The fullest and most satisfactory account of Bewick, and one which for all practical purposes may be regarded as sufficient and final, is contained in "*The Life and Works of Thomas Bewick*," by D. C. Thomson (London, 1882). The volume is illustrated with many impressions from the original wood-blocks.

BEX, a small town in the Swiss canton of Vaud, is situated near the right bank of the Rhone, 12 miles above its entrance into the Lake of Geneva. It stands in a fertile valley, at the foot of high mountains, which rise nearly 9000 feet above the sea. There are salt springs and works for extracting the salt near Bex, and also hot mineral springs. Population, 3500.

BEY is a Turkish word which signifies prince, lord, or chief, and in the Ottoman empire is rather vaguely used as a title of governors and other high officers of the state. It is also frequently subjoined to proper names, to distinguished persons of high rank generally.

BEYPUR (*Vappura*, *Vada Perapana*), a town in Malabar district, Madras, is situated near the mouth of the Bepur river, 6 miles south of Calicut. Though many attempts have been made to utilize the great natural advantages of its position, it was not until 1858, when Bepur was made a terminus of the Madras Railway, that the town became of importance. The Portuguese established a factory (*Kalyan*) here, but it failed; Tipu selected it as the site of the capital of Malabar, but hardly a vestige of its short-lived importance has survived; in 1797 steam saw-mills, in 1805 a canvas factory, in 1848 iron-works, and later still shipbuilding works were started here, but all from one cause or another failed. In 1858, however, the railway created the present town, and Bepur is now every year becoming of more importance. Being a regular port of call for steamers, it possesses a custom-house, a salt depot has been established here, while all the coffee of the Ochertony valley, with much from the East Wynaad, comes to Bepur for export. Rice forms the staple of the import trade. The bar admits craft of 300 tons to the river, and at low spring tides gives soundings of from 12 to 14 feet. Iron ore and coal both exist in the immediate vicinity of the town, and wood in great abundance. The teak grown on the ghats to the east is floated down to Bepur for exportation.

BEYRA or **BEIRA**, a province of Portugal, bounded N. by the provinces of Minho and Tras-os-Montes, from which it is separated by the Douro; S. and S.W. by Alem-tejo and Portuguese Estremadura; E. by Spain and W. by the Atlantic. Its greatest breadth is about 120 miles, and its greatest length 130 miles; the area is 8586 square miles, and the population in 1883 was 1,300,000. The length of its sea-coast is about 80 miles. The province is divided into three parts. That portion comprised between the Douro and the Serra de Estrella is called High Beira; from this mountain range to the banks of the Tagus, Low Beira;

and the western part of the province, between the ocean and Serra de Alcoba, is called Beira Mar, or Maritime Beira.

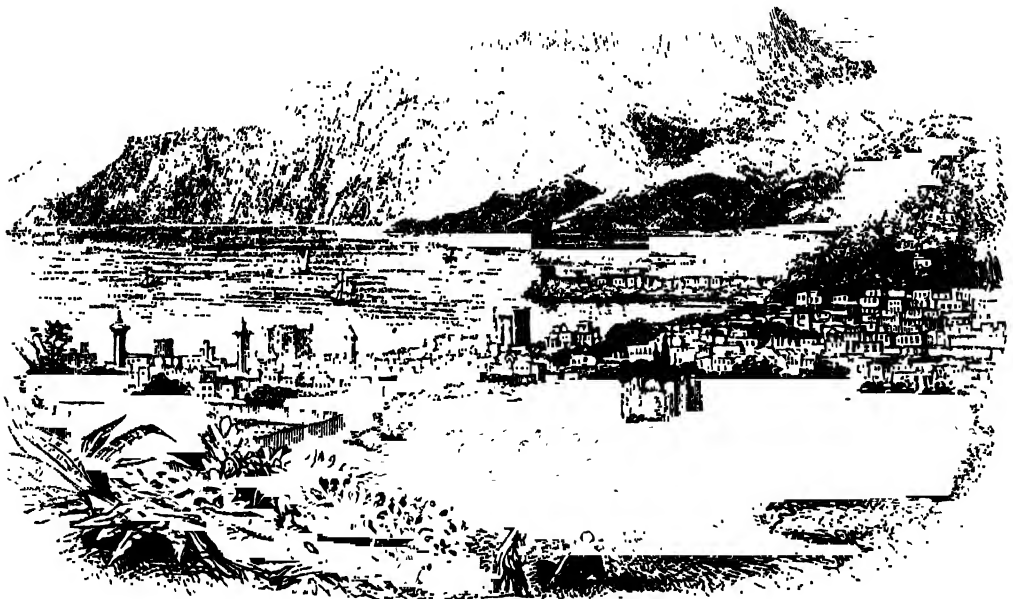
Two chains of mountains running nearly parallel to one another cross the province from north-east to south-west—the Serra de Estrella, which in some parts is 7524 feet above the sea-level, and the Serra de Alcoba. From these two principal chains smaller ones branch out in different directions, occupying the greatest part of High Beira. All these highlands are bare of trees, but produce abundant pasture for cattle.

The principal rivers of Beira proceeding from east to west are the Elgas, the Aravil, the Ponsul, the Vereza, and the Zezere, all of which flow southward into the Tagus. The Turones, which is joined by the Aguada, the Coa, which is fed by the Pinhel and the Lamegal, the Tavora,

and the Pavia, flow northwards into the Douro. The Mondego springs from the Lago Escuro in the Serra de Estrella, flows N.W. as far as Fornos, where it turns to S.W., and leaving Coimbra on its left bank falls into the Atlantic at Figueira. The Vouga crosses the north-western districts of Viseu and Aveiro.

The province is very hilly. The valleys are fertile, and produce wheat, Indian corn, rye, wine, and fruit. The honey of Beira is celebrated throughout Portugal. The western and southern parts of the province are very productive, but in the mountainous districts the products are scarcely sufficient for the support of the inhabitants.

BEYROUT is a seaport town of Syria, on the shores of the Mediterranean, situated on the south side of an open bay. It was a Phœnician city of great antiquity, and



Beyrouth and Mount Lebanon.

was called *Berytus* by the Greeks and Romans. Augustus made it a colony, with the title Colonia Felix Julia, and medals were afterwards struck in honour of the Roman emperors, bearing the legend Colonia Felix Berytus (Plin. v. 20). Agrippa, the grandson of Herod the Great, decorated the town with a theatre, amphitheatre, and baths, and instituted games. Under the later empire Berytus had a celebrated law school, the foundation of which is ascribed to Alexander Severus; it certainly flourished at least before Diocletian. The splendour of this school, which preserved in the East the language and jurisprudence of the Romans, may be computed to have lasted from the third to the middle of the sixth century (Gibbon, ii. 294). Beyrouth again rose to importance in the time of the Crusades, and was captured by Baldwin I. in 1111, after a two months' siege. In 1772 it was bombarded by a Russian fleet, and as it was on the side of the Pacha of Egypt it was nearly destroyed by an attack of the English in 1840 under Admiral Stopford, and restored to Turkey.

Beyrouth is built on a headland which is the most projecting part of the coast, and the greatest elongation of the highly fertile plain which lies at the foot of Lebanon.

It is dominated by the highest range of these mountains, which rises about 9000 feet. The climate is of a medium temperature, and is deemed the healthiest on the coast—the Lebanon, distant about an hour's travel, offering an easy refuge during the summer heats. The population in 1883 was 80,000, the majority of whom are Christians, as compared with 12,000 in 1835. The old city, with its narrow, tortuous streets, bazaars, and native workshops, is now the business place, and the residence of the poorer classes. The new town, which lies scattered around, with its modern-built houses, carriage roads, and gardens, its churches, colleges, schools, and hotels, has little or nothing oriental in its composition. The comparatively rapid progress of the city is chiefly owing to its facilities for the extension of the silk trade, of which it is the centre, thus attracting foreign merchants and capital; and also to its being the residence of the consuls-general, and the better protection thereby afforded both to foreigners and natives. In 1875 the city was provided by an English company with an efficient supply of good water from the Bahr-el-Kelb, or Dog River, a distance of 9 miles.

Beyrouth is the port of Damascus, from which it is distant

60 miles. It is the chief seaport, market-town, and emporium of all the trade with the shores of Syria, Palestine, and Cilicia. The city supplies the Lebanon, Damascus, and the north of Syria to Antioch and Joppa, with European manufactures and goods. French steamers, carrying mails, leave every week for Marseilles; and British steamers ply between Liverpool and Beyrout, bringing Manchester manufactures, prints, chintzes, Birmingham and Sheffield cutlery, &c., and returning to Liverpool with madder roots, wool, silk, and valonia, or wheat. The total annual value of the imports is about £1,200,000, and of the exports £750,000. About half the imports are from England and half the exports to France. Large tracts of fertile land around Beyrout lie barren for want of moisture, which might be secured by the restoration, at a small cost, of the aqueducts and dams, the vestiges of which are still to be seen.

Beyrout possesses no port or harbour. Ships anchor in the open roadstead, and in stress of weather either go to sea or run to St. George's Bay, about 2 miles to the east.

BEZA, an eminent theologian of the Calvinistic branch of the Reformed Church. He is commonly known by the Latinized name of Beza, but his real name was Théodore de Bèze. He was a Frenchman, born of noble parents, in 1519, at Vezelai, in the present department of Yonne. When only ten years old his uncle placed him under the care of Melchior Wolmar, a German, resident at Orleans, who was well skilled in the Greek language, with whom he remained seven years. In 1535 Wolmar returned to Germany, and Beza repaired to Orleans to study law; but his attention was chiefly directed to the classics and the composition of verses.

Beza obtained his degree as licentiate of civil law when he had just completed his twentieth year, upon which he went to Paris, where he spent nine years. He was young, possessed of a handsome person, and of ample means; and, though he has himself denied that his life was grossly immoral, yet it seems to have been very free, and some of the poems in his "*Juvenilia*," published in 1548, and dedicated to Wolmar, are no doubt licentious—a fault he never sought to extenuate. "His conscience," he says, "bade him profess the Reformed religion;" but he continued to adhere to the dominant church, in which, though not a priest, he held some valuable preferments, and he privately married a woman of birth, he says, inferior to his own, but possessed of such virtue that he never found reason to repent of the connection. In this divided state of mind he remained till a serious illness brought him to a more manly and a more holy temper. Immediately on his recovery he fled to Geneva, at the end of October, 1548, and there publicly solemnized his marriage and avowed his faith.

After a short residence at Geneva, and subsequently at Fribingen, Beza was appointed Greek professor of the college of Lausanne. During his residence here, at the suggestion of Calvin, he undertook to complete Clement Marot's translation of the Psalms into French verse. Beza at this time also wrote his treatise, "*De Hæreticis a Civili Magistratu Puniendis*," in defence of the execution of Servetus at Geneva in 1553.

After ten years' residence at Lausanne, Beza removed to Geneva in 1559. About this time he entered into holy orders. At Calvin's request he was admitted to be a citizen of Geneva; he was appointed to assist that remarkable man in giving lectures in theology; and, on the academy or university of Geneva being founded, he was appointed rector. During the war of religion in France which followed the massacre of Vassy, Beza attached himself to the person of Condé, and was present at the battle of Dreux, where Condé was taken prisoner. At the end of the war, in 1568, Beza returned to Geneva. In 1564 he succeeded not only to the place but to the influence of Calvin, and from thenceforth was regarded as the head and leader of the Genevese church. In 1571 he was

elected president of the general synod of French Protestants held at Rochelle, by which the confession of faith of the Gallican church was settled. After the massacre of St. Bartholomew, in 1572, Beza showed himself prompt to succour the distressed Protestants who flocked to Geneva.

He scarcely manifested the infirmities of age until 1597, when he was obliged on more than one occasion to quit the pulpit, leaving his sermon incomplete. He declined gradually under the weight of years, and died on the 13th of October, 1605. An interesting account of his last moments is given by La Faye. La Faye has given a list of Beza's works, which are fifty-nine in number. He is, however, best known in connection with his translation of the New Testament into Latin (Paris, 1557), and his "*History of the French Protestants*."

BEZA'S CODEX, a celebrated manuscript, containing the four Gospels and Acts of the Apostles written in Greek, with a corresponding Latin text on every opposite page.

This singular manuscript was presented to the University of Cambridge by Theodore Beza in the year 1581, whence it has its name of "*Codex Beza*," and is sometimes cited as "*Codex Cantabrigiæ*." It is a thick quarto volume, written upon vellum, in uncial letters of the square form, that is, in large capitals quadrated, as distinguished from the sharper uncials. The letters in some places, particularly in the beginning of the first leaf, are scarcely legible. The Gospels are placed in the usual order of the Latin manuscripts—Matthew, John, Luke, Mark. This codex has no stops, marks of aspiration, or accents.

In 1787 the University of Cambridge appointed Dr. Thomas Kipling to edit this highly prized manuscript in facsimile, that is, as far as metal types could be made to represent it, for an absolute facsimile could be obtained only by engraving. It appeared in 1793, in two volumes folio, edited with a careful and exact observance of the original, accompanied by a preface of twenty-eight pages, and followed by twenty-four pages of notes.

BEZANT' (also called Byzant, Besant, Bezantus, Byzantius, Byzantinus, Byzantens, and Bixantius), a gold coin anciently struck by the emperors of Constantinople, and taking its denomination from Byzantium, the ancient name of that city. From the ninth to the fourteenth century the Bezant was the principal gold coin current in Europe, and the name was applied to several kinds of coin struck in other places than Constantinople. The Constantinopolitan Bezant is in the form of an unbo or hollow dish, frequently bearing a representation of our Saviour, and seems to have been generally of about the value of a ducat, or nine shillings. Moorish Bezants are flat.

BEZANT', in heraldry, is a round disc or plate, always by English heralds emblazoned gold, though by foreign heralds made both gold and silver. The name is evidently taken from the coin above described.

BEZIERS, a city of France, in the department of Hérault, the chief town in the arrondissement of the same name, stands on a hill above the Orb and the Canal du Midi, and has 39,490 inhabitants. The situation of the town is so beautiful that it gave rise to the proverb, "*Si Deus in terris, vellet habitare Betteris*" ("If God were to dwell upon earth it would be in Betteris")—Betteris being the ancient name of the town. The streets are narrow and ill laid out, but improvements have been made, including a new bridge leading into the town. It contains several buildings interesting for their architecture or their antiquity; the principal are the Cathedral of St. Nazaire; the churches of St. Aphrodise and La Madeleine; the former episcopal palace, which now serves for the residence of the subprefect and for courts of justice; the public library; the house of Pierre Paul Riquet, the engineer of the Canal du Midi; the market-house; and the barracks. The town has a tribunal of commerce and a college. It is the great centre for the distillation of alcohol in the south of France.

It also has manufactures of woollen cloth, silk, hosiery, dunnity, gloves, parchment, verdigris, confectionery, chemical products, thrown silk, soap, leather, paper, glass, &c.; the commerce of the town consists of these articles and of corn, wool, iron, wine, oil, fruits, &c. The Canal du Midi is carried through nine locks close to the town. The town of Beziers is ancient; it contains many traces in the shape of remains of amphitheatres, aqueducts, &c., of the importance it attained under the Roman occupation. It was the scene of a frightful massacre of the Albigenses in 1209, when every living being in the place was killed.

BEZOARS. The term bezoar, given to certain concretions found in the stomach and intestines of various quadrupeds, is probably derived from the Persian *Pūd-zahr*, "expeller of poison." From early times these concretions were regarded as possessing important medicinal qualities, and as being antidotes against poison. They are the results of morbid action or disease; and their rarity, as well as the virtues attributed to them, once contributed to make them prized; they have sometimes been sold for ten times their weight in gold. Those which were most esteemed came from the east, and were the earliest used. Of these the most valuable were obtained from the stomach of the Persian wild goat. The greater number of bezoars are obtained from ruminating animals; in many instances they are mere balls of hair, alternating in layers with fibrous portions of food, having a central nucleus of some hard object, as a bit of stone, or iron, or a piece of shell, and are agglutinated by the mucus of the stomach. In some cases these concretions consist of concentric layers of some of the compounds of lime around a hard central nucleus, often metallic, and when sawn asunder bear a high degree of polish; such formations occur in the rumen of the ox, in the stomach of the horse and of other animals. The American bezoars are chiefly obtained from the rumen of the llama or vicuña. These have been analyzed and found to consist chiefly of phosphate of lime.

BHADRINATH. See **BADRINATH**.

BHAGALPUR, a division or commissionership under the Lieutenant-governor of Bengal, British India, lying between 23° and 27° N. lat., and between 85° and 89° E. lon. Its area is 18,685 square miles, and the population 6,613,358. It comprises the districts of Bhagalpur, the Santal Parganas, Maldah, Monghyr, and Purniah.

BHAGALPUR, a district of the above division, lying between 24° 32' and 26° 35' N. lat., and between 86° 21' and 87° 33' E. lon. Its area is 4268 square miles, and the population 1,850,000. It is bounded on the north by the independent state of Nepal; on the east, north of the Ganges, by the district of Purniah; on the south and on the east, south of the Ganges, by the Santal Parganas; and on the west by the districts of Tihut and Monghyr. The administrative headquarters are at Bhagalpur, on the right or south bank of the Ganges.

The district is divided into two nearly equal portions by the Ganges. The northern division forms a continuation of the great alluvial plain of Tihut, being intersected by many rivers, which are connected with each other by innumerable *akars* or water-courses; the whole tract is liable to inundation by the flooding of these rivers, and by the overflow of the Ganges on its northern bank. The north-eastern portion of the district, formerly one of the most fertile regions in the sub-Tarai rice tract, has been completely devastated by the changes in the course of the Kusi; the country has been laid under a deep layer of sand, and the once fertile soil is covered with high grass jungle, which gives shelter to tigers, buffaloes, and rhinoceroses.

The southern bank of the Ganges is protected against encroachments of the river by a ridge of limestone 2 miles broad, which extends for a distance of 60 miles, from near Monghyr to Colgong, and is thickly wooded with palms, mangoes, and jack-trees. South of this wooded bank, for

a distance of 4 miles, the country is low, bare, and except in the cold weather and spring, almost entirely uncultivated. Further south again, the land rises a few feet; the soil is rich, and covered with rice and other crops; mango and palm groves abound, and numerous villages dot the plain. Very marked changes have taken place in the courses in the two most important of these rivers—the Ganges and the Kusi. The stream of the Ganges in 1864 ran directly below the town of Bhagalpur, and steamers anchored close under the houses of the residents; a few years earlier the river flowed equally near the northern bank, formed by *pargana* Chai; its present course is between these limits. The channel of the Kusi seems to have been advancing steadily westward for many centuries; the large village of Nathpur, which in 1850 lay some miles to the west of the river, has not only been swept away, but its site has been left many miles to the eastward.

The principal crop in the district is rice, but this staple does not bear the same relative importance in Bhagalpur as in most other districts of Bengal. It was introduced at a comparatively recent period, and is still too scarce and dear to be the common food of a people who have long been accustomed to support life on more hardy grains and on jungle produce. Among the other crops grown in the district are wheat, Indian corn, several kinds of millet, pease, oil-seeds, and indigo. Indian corn forms the staple food of the poor of Bhagalpur; it is sown in April or May, and ripens in August. When grown on high land this crop requires irrigation. The out-turn varies from 11 to 18 cwt. per acre. Indigo, which covers about 10,000 acres in the district, is sown in October and cut in the beginning of the rainy season.

The principal manufacture of the district is indigo. Several kinds of coarse glass are made, and cotton weaving and the manufacture of saltpetre are carried on to a limited extent. The trade of the district is yearly increasing, the principal exports being rice, wheat, grain, barley, Indian corn, and oil-seeds, and the chief imports salt, sugar, and piece-goods; the exports largely exceed the imports in value.

Malarious fevers, generally intermittent, but sometimes also remittent, are endemic in the district, chiefly in the northern division. They are most prevalent during the rains and in the beginning of the cold weather, and 55 per cent. of the mortality of the district is attributed to this cause. Dysentery and diarrhoea are always very prevalent; and among the other common diseases of the district are scurvy, jaundice, leprosy, bronchitis, and asthma. The most common of the deadly epidemics is cholera; but Bhagalpur, although it is every now and then visited by severe outbreaks, does not suffer so seriously as some of the neighbouring districts—a fact attributed to the small number of fairs and religious gatherings which are held, and to the comparatively scanty attendance at those which do take place.

BHAGALPUR, the chief town and administrative headquarters of the above district, is situated on the right or south bank of the Ganges, which is 7 miles wide at this point. The town is 2 miles in length and about a mile in breadth. It is a station of the East India Railway, and is distant from Calcutta 265 miles; by river, 326 miles. Within the town and in its neighbourhood (at Champuagar) are some interesting Mohammedan shrines, and two remarkable places of worship, belonging to the sect of the *Oswals*. The Karnagarh Plateau, near the town, formerly contained the lines of the "Bhagalpur Hill Rangers," organized by Cleveland in 1780. It continued in their possession until 1863, when the battalion was disbanded, and it is now held by a wing of a native infantry regiment. The town contains two monuments to the memory of Mr. Augustus Cleveland, some time collector of Bhagalpur district—one of brick, erected by the landholders of the district; the other of stone, sent out by the Court of Directors of the East India Company from England. An attempt has been

made to prove that Bhagalpur occupies the site of the ancient Palibothra, but there seems no sufficient reason to doubt the common identification of Patna with that city. The population in 1883 was 70,000.

BHAG'AVAD-GITA (i.e. "Revelations from the God") is the title given to a long religious poem, written in Sanskrit, which has been introduced as an episode in the great Indian epic of the Mahabharata. It is generally attributed to a period about the first century A.D., but the author is unknown. It is cast in the form of a dialogue between a Pandava prince, named Arjuna, and the god Krishna, who has assumed the guise of his charioteer. The work has been divided, according to Cockburn Thomson, into three portions, the first being considered purely practical, the second theological, and the third of a speculative character. It is held in high veneration in India, where numerous commentaries have been written upon it, and where it has been translated into all the nine important languages. The first English translation was that of Sir Charles Wilkins (London, 1785); the latest is that of Thomson (1855). It has also been translated into French and German, and an excellent Greek version by Demetrios Galanos was published at Athens in 1846. The Sanskrit text was first published at Calcutta in 1808, and it has since been published by A. W. von Schlegel (Bonn, 1823; second edition, 1846).

BHANDARA, a British district in the Chief-commissionership of the Central Provinces, British India, lying between 20° 38' and 21° 46' N. lat., and 79° 29' and 80° 43' E. lon. It is bounded on the north by Seoni and Balaghat, on the south by Chanda, on the east by Raipur, and on the west by Nagpur. The area is 3922 square miles, and the population 580,000.

Towards the west Bhandara stretches out in an open plain to the banks of the Wainganga, which flows along the whole length of the western border; on the north and east, hills, inhabited chiefly by Gonds and other wild tribes, shut it in. Upwards of one-third of the district is covered with jungle. Few of its mountains attain any considerable height. Of the rivers of Bhandara, the Wainganga alone retains water through the hot season. But the lakes and tanks, of which there are said to be no fewer than 3648, form the most striking feature of Bhandara. By taking advantage of the dips and hollows afforded by an undulating country, or by excavating artificial basins and throwing long dams across sloping ground, sheets of water, often of enormous size, have been formed. Owing to the large extent of forest, wild animals abound. The tiger and the panther cause the greatest destruction to human life; and during the rainy season many persons die from the bites of venomous snakes. Deer of all kinds and wild pigs swarm in the woods, and frequently inflict great injury upon the crops.

In Northern Bhandara, as soon as the rice harvest has been garnered, the husbandmen cut the dam, let the water out of the tank, and sow wheat or linseed in the bed; this appears the only means they have of raising a dry crop in the district. Cloth and brass, and potstone wares constitute the chief manufactures.

The inhabitants of Bhandara, even among the higher classes, have a reputation for bluntness and discourtesy; nor do they compensate for this defect by their candour or manliness. Indeed, the two proverbs most frequently in their mouths by no means tend to a practice of the virtues which are usually associated with a rude simplicity—"Charity remains at home," and "The perfection of wisdom is deceit." These are the favourable sentiments of a native of Bhandara. Good treatment, however, will generally bring out honesty and industry among the Gonds, and the Ponwars make hard-working agriculturists. But the population generally have none of the hardy, active habits often found in Northern India. Rarely does a person of the higher rank mount a horse; for nearly every journey, long or short, he has recourse to a small two-wheeled ox-

cart. In this district, contrary to the general custom in India, girls receive more honour than boys; and the usual method of betrothals is reversed, as the relatives of a boy are fain humbly to supplicate the parents of the girl whose hand they would win, instead of being sought after themselves. The general ignorance shows itself in the loose notions entertained by the people regarding the respect due to the various Hindu divinities. Thalic worship is almost universal throughout the district, and all kinds of quadrupeds and various reptiles receive the adoration of their several votaries. The few Mohammedans in the district are notorious for neglect of their religious duties, and for their disorderly and dissipated life.

The most deadly disease is fever, which prevails throughout the year, but proves most fatal during the months of September, October, and November. Nearly 80 per cent. of the deaths must be attributed to this cause. Bowel complaints also carry off large numbers.

BHANDARA, the headquarters of the above district, is situated on the Wainganga River, close to the Great Eastern Road. The town has a good trade in the hardware it manufactures, and in cotton cloth. Built entirely on red gravel it is dry and healthy, but depends for its water on wells and tanks outside. It has a district court, post office, government dispensary, gaol, police headquarters, travellers' bungalow, public library, and a government *zila* school. The population is 12,000.

BHANG. See CANNABIS.

BHARAICH. See RAHRAICH.

BHARTPUR (*Bharatpur*) or **BHURTPUR**, a state in Rajputana, under the political superintendence of the Rajputana Agency and the government of India. It is bounded on the north by the British district of Gurgaon, on the east by Muttra and Agra, on the south and south-west by Dholpur, Karauli (Kerowlee), and Jaipur (Jeyapore), and on the west by Alwar (Ulwar). It is about 77 miles in length from north to south, and 50 in breadth. The area is 1974 square miles.

The principal castes are Jats, Gujars, Brahmans, Banias, and Meos. The country is popularly known as Brij, or the land of Krishna, and the language, Brij-basha, is a village patois. Bhartpur is the only Jat principality of any magnitude in India, and perhaps the only state in which a great proportion of the people belong to the same race as the nobles and princes.

Ranjit Singh, the rajah of Bhartpur, was one of the first of the chieftains of Hindustan to connect his interests with those of the British government. At the commencement of the Mahratta war, in 1803, a treaty was concluded with him, as a consequence of which Lord Lake was joined by a Bhartpur contingent of horse, which did good service at the battle of Laswari (Laswaree), and throughout the campaign against Sindhia. For these services the British government transferred to Bhartpur five districts, yielding seven *lakhs* of rupees. But when war broke out with Holkar, the Rajah of Bhartpur first attempted evasion and then refused to send his contingent; and when the routed troops of Holkar were pursued to the glacia of Dig, a destructive artillery fire was opened from the ramparts on the British troops. Thereupon Lord Lake attacked Dig, and carried it by assault. Bhartpur was then invested on the 7th of January, 1805. The town was 8 miles in circumference, surrounded by a mud wall of great height and thickness, protected by numerous bastions, and a broad and deep moat filled with water. The garrison was estimated at 8000 men; and the artillery at hand for employment in breaching bore no proportion to the defensive strength of the works. Four successive assaults were repulsed; and finally the British army, with a loss of 388 killed and 1894 wounded, was compelled to withdraw. Though victorious, the rajah was evidently alarmed at the pertinacity of the assailants, and his success was followed

by overtures for peace. Ranjit Singh surrendered the fort, and agreed to expel Holkar from his territories. By this treaty the five districts conferred on him in 1803 were resumed, and he agreed to pay an indemnity of 20 *lakhs* of rupees (£200,000), seven of which were subsequently remitted. Ranjit Singh died in 1805, leaving four sons. The eldest, Randhir Singh, ruled for eighteen years; the second, Baldeo Singh, succeeded, but only ruled eighteen months. Balwant Singh was now the rightful heir; but his cousin Durjan Sal, grandson of Ranjit Singh, seized the fortress of Bhartpur and imprisoned the heir in 1826. An army of 25,000 men, well provided with artillery, led by Lord Combermere, marched against Bhartpur. Notwithstanding the large force of artillery, the strength and thickness of the walls offered such resistance to the breaching batteries that it became necessary to resort to mining. The mines were commenced on 23rd December, and sprung on the 17th January following, when a sufficient breach was effected, and the fortress carried by assault on the 18th. Durjan Sal was made prisoner; Balwant Singh, then an infant, was placed in power, his mother acting as regent, and a political agent superintending affairs. In 1835 Balwant Singh was put in charge of the administration, and died in 1853, being succeeded by his only son, Jaswant Singh, who was born in 1850. The rajah's title is Brijindar Sawai.

BHARTPUR or **BHUTPOOR**, the chief town and fortress of the above state, is situated on the highroad between Agra and Ajmere, and on the Rajputana State Railway, 35 miles from Agra and 112 from Jaipur (Jeypore). The forts and ramparts, as they now stand, were constructed in 1733 by Budan Singh. The town is named after Bharat, a legendary character of great fame in Hindu mythology, and is considered to be under the tutelary influence of Krishna, who is worshipped here under the name of Bihari. The population in 1883 was 62,000.

BHAUNA'GAR (*Bhavanagar*), a native state within the British agency of Kathiawar in the province of Guzerat (Gujarat), Bombay, lying between 20° 56' and 22° 16' N. lat., and between 71° 16' and 72° 20' E. lon. The area is 2784 square miles, and the population 400,000, consisting chiefly of Hindus of the Vaishnav, Sumast, and Jain sects, and Mohammedans. Over about one half the area the soil is the *regar* or black cotton earth; the remainder is light and sandy. Water is obtained from wells and rivers. The climate on the sea-coast is good, but inland it is hot and dry. The most common disease is fever. The chief products are grain and cotton, and the manufactures are oil and cloth. The quantity of cotton produced is very considerable, and forms one of the chief sources of wealth of the state.

Bhaunagar ranks as a first-class tributary state among the many states in Kathiawar; its chief is entitled to a salute of eleven guns, and maintains a military force of 2765 men. He has powers of life and death over all except British subjects.

BHAUNAGAR, a port in the Gulf of Cambay, and the chief town of the above state, was founded in 1743, and rapidly rose to influence under a line of princes who encouraged commerce and suppressed the piratical communities which infested the Gulf of Cambay. It has a good and safe harbour for shipping of light draught, and carries on an extensive trade, being the principal market and harbour of export for cotton in Kathiawar, and possesses a spinning and weaving mill.

BHAWALPUR, a native state in political relation with the government of the Punjab in British India, but situated between that province and Sind. It is bounded on the N.E. by the British district of Sirsa, on the E. and S. by the Rajputana states of Bikaner and Jeyshmere, on the W. by the Indus and the Sutlej rivers. The area is about 22,000 square miles. Along the rivers lies a strip

of alluvial soil from 8 to 14 miles in width. In the centre of the state is a belt of higher land about 20 miles wide, and on the E. commences the great sandy desert which stretches into Rajputana. The surface consists of a succession of undulating sand ridges from 100 to 500 feet high. The population is estimated at 500,000, of whom more than 400,000 are Mohammedans. The principal articles of production are *lungis*, *suji*, silk goods, indigo, cotton, and cereals. Considerable extensions have been lately made in the area irrigated by state canals. The Indus Valley State Railway runs through a large portion of the territory, crossing the Sutlej River by a magnificent bridge at the town of Bhawalpur.

The political relations of Bhawalpur state with the paramount power are fixed by the treaty of the 22nd October, 1838. The British government is bound to protect the principality and territory, the nawab to act in subordinate co-operation with the British government, and to acknowledge its supremacy. The nawab and his heirs and successors are to be absolute rulers of their country, and British jurisdiction is not to be introduced.

BHEL. See **ÆGLE**.

BHILSA, a town in the Bhopal state, Central India, is situated 26 miles N.E. of Bhopal. It is perched on a rock, and has a fort inclosed by a castellated stone wall and surrounded by a ditch. After changing hands several times Bhilsa was finally (in 1570) incorporated with the empire of Delhi by Akbar. The place is now only noteworthy as giving its name to the remarkable and interesting series of Buddhist tope found in its neighbourhood. Mr. Fergusson describes this series as "the most extensive and, taking it altogether, perhaps the most interesting group of tope in India," and devotes half of his work on "Tree and Serpent Worship," and forty-five plates besides woodcuts, to the illustration of the great tope at Sanchi.

BHOOJ. See **BURJ**.

BHOOTAN. See **BIUTAN**.

BHO'PAL, a tract of country in Central India occupied by a collection of native states (known as the Bhopal Agency) under the political superintendence of the governor-general's agent for Central India. It is bounded N. and E. by the Central Provinces, and S. and W. by various native states of Central India. The area is about 10,150 square miles, and the population 1,000,000. The ten states comprising the agency are Bhopal, Rajghar, Narsinhghar, Karwai, Maksudangar, Kilehipur, Basoda, Muhammadghar, Pathari, and Larawad. In addition to the above the political agent has charge of isolated patches of territory belonging to the states of Gwalior, Indore, Tonk, and Dewas.

BHOPAL, a native state in Malwa in the Bhopal Political Agency, Central India, under the government of India, lying between 22° 32' and 23° 46' N. lat., and between 76° 25' and 78° 50' E. lon. The estimated area is 8200 square miles, and the population 780,000. It is bounded N. by Sindhi's possessions and Dhar, E. by Sagar (Sungor), S. by the Narbada (Nerbudda), and W. by Holkar's and Sindhi's possessions.

The Bhopal dynasty was founded by Dost Mohammed, an Afghan in the service of Aurangzeb, who took advantage of the revolutions which followed the death of the emperor to establish his independent authority in Bhopal and the neighbouring country. The Bhopal family have always manifested an amiable feeling towards the British government. In 1778, when General Goddard made his bold march across India, this state was the only Indian power which showed itself friendly; and in 1809, when another British expedition, commanded by General Close, appeared in that part of India, the Nawab of Bhopal earnestly, but in vain, petitioned to be received under British protection. The nawab then allied himself with the Pindaris, and made a most gallant defence against the attempts of Sindhi and

Raghoji Bhonsla to crush him. Their efforts were finally restrained by the intervention of the British power. In 1817, at the commencement of the Pindari war, the British government formed a close alliance with Bhopal. A treaty was made in 1818 by which the British government guaranteed his possession of the state, and the nawab agreed to furnish a contingent of 600 horse and 400 infantry, and received five districts of Malwa as a reward for his services, and to enable him to maintain the contingent. The nawab soon after met his death from a pistol accidentally discharged by a child. His nephew, an infant, was thereupon declared his successor, and betrothed to the infant daughter of the deceased prince. But the widow of the nawab, Kudsia Begum, wished to keep the state in her own hands, even after the declared heir had resigned his claim to the state and to the hand of the nawab's daughter, Sikandar Begum, in favour of his brother, Jahanger Mohammed. After much dissension lasting through several years, in 1837, through the mediation of the British government, Jahanger Mohammed was restored to power and installed as nawab. On his death in 1844 he was succeeded by his widow, Sikandar Begum, who ruled Bhopal until her death in 1868. She made a name for herself by faithful services to the government of India during the mutiny, and by the ability she displayed in the management of the state. She was succeeded by Shah Jahan, who proved no unworthy successor. Her first husband died in 1867, leaving her one daughter, Sultan Jahan. After her husband's death Shah Jahan, following the footsteps of her mother, threw aside the restrictions of the purdah, conducted business with vigour, and was always accessible. In recognition of her high administrative qualities and her loyalty she received in 1872 the honour of the Grand Cross of the Star of India.

BHOPAL, the principal town of the above state, is surrounded by a masonry wall 2 miles in circuit, within which is a fort, also of masonry, both much dilapidated. Outside the town is a *ganj* or trading quarter, and to the S.W. on a large rock is a fort called Fatchgarh, with a masonry rampart and square towers, the residence of the ruler of the state. S.W. of this fort spreads a fine artificial lake $4\frac{1}{2}$ miles long and $1\frac{1}{2}$ mile broad, and on the E. of the town another, 2 miles in length.

The political resident lives at Bhopal, which is distant from Allahabad 325 miles S.W., from Calcutta (*via* Sambulpur and Nagpur) 790 N.W.

BHORE GHAT, a mountain pass 6 miles in length in the Presidency of Bombay, about 40 miles S.E. of the city of Bombay on the road to Poonah. It was formerly considered the key to the Deccan, and a proposal was made to fortify it strongly. It is now traversed by an excellent road, and also by the railway from Bombay to Poonah and Solapur.

BHUJ, the chief town of the state of Cutch (Kachchh), British India, in political connection with the Bombay Presidency, is situated at the base of a fortified hill. It is a cantonment town, and has a post-office and a dispensary. The place is chiefly interesting for its archæological monuments, and as having been at an early period dedicated to the snake divinity Bhujanga or Bhujija. The mosque inside the city gate is remarkable for the thickness of its piers and their closeness to each other—an arrangement by which only a few of the worshippers can ever be within sight of the rest. The town contains the mausoleums of the rasos of Cutch, and in its neighbourhood are a number of shrines and Mohammedan *daryahs* of no special importance. Population, 24,000.

BHURTPUR. See BHARTPUR.

BHUTAN. This territory lies to the E. of Sikkim, between the Jalpaiguri and Goalpara districts of Bengal and Assam and the mountains that form the S. slope of the Himalayas. It extends from E. to W. 230 miles,

with a breadth of about 120 miles, lying between $26^{\circ} 18'$ and $28^{\circ} 2'$ N. lat., and $88^{\circ} 32'$ and about $92^{\circ} 30'$ E. lon. The eastern limits are not certainly known; the area is about 19,000 square miles. It is crossed by two ranges of mountain land parallel to the great mountain chain beyond—one (the nearest) 8000 feet high generally, with occasional peaks as much as 16,000 feet, the other more distant and less lofty. Between the Himalayas and the first range is a high table-land, too bleak and barren to be habitable, except at the foot of the first range, where are most of the principal towns. To the E. of the second range the land is level, and S. of the lower range are the duars, tracts of country of extraordinary fertility, whose produce once formed the chief means of subsistence of the people. These duars were ceded to the British in 1866. On the N. Bhutan is bounded by Tibet, and on the E. by tracts inhabited by uncivilized mountain tribes. The scenery of Bhutan is scarcely to be equalled by that of any other country for sublime and romantic magnificence. At one view may be seen rugged barren hills and valleys covered with luxuriant vegetation, rushing mountain torrents and gentle streams, dense forests and sunny slopes, placid lakes and steep precipices, and vast ranges covered with eternal snow; while, in regard to climate, the cold of Siberia, the heat of Africa, and the pleasant warmth of Italy may all be experienced in a day's journey.

The soil produces rice, wheat, and millet in abundance, and game of all kinds abounds in the forests; sheep, ponies, and a hardy breed of horned cattle are reared. The roads are mere tracts through ravines which become torrents in the rainy season. The population, estimated at about 20,000, consists of three classes—the priests, the chiefs or penlows (who are the governing class), and the cultivators.

The country is governed nominally by a person called the Dharma Rajah (supposed to be a divinity in human shape), but really by the Deb Rajah, who is elected by the penlows every three years from their own number. Under the system of government the people are oppressed and poor. On the testimony of British envoys who have traversed the country it is said that nothing a Bhutia possesses is his own, he being at all times liable to lose it if it attracts the cupidity of any one more powerful than himself. The doctrine that "might is right" prevails everywhere. No official has a salary, but has certain districts made over to him, and he may get what he can out of them; the more he can extort and transmit to his superiors the longer will he retain his office. Buddhism is supposed to be the religion of the country, but in reality religious exercises are confined to the propitiation of evil spirits. Physically the Bhutias are a fine race, hardy and vigorous, but not very cleanly in their habits and persons.

Bhutan trades with all the neighbouring countries, but chiefly with Tibet, Bengal, and Assam, in horses, cloth, musk, fly-whisks, walnuts, oranges, and Indian madder, receiving in exchange woollen cloths, cottons, asafetida, spices, tea, gold, silver, and embroideries. The revenues of the country are usually paid in articles of produce and merchandise.

The chief towns are Punakha or Dosen, the capital, on the left bank of the Bhangi river, and 96 miles E.N.E. from Darjeeling; Tashichozong and Paro, on the river Gudu; and Tongsa, on the road from Assam to Lassa. The other towns are Wandipur, Ghassa, and Murichom. Punakha is a place of great natural strength.

The language spoken by the Bhutias is said to be a dialect of the Tibetan, more or less blended with words and idioms of the countries on which their own territory touches. In their religious observances the most remarkable circumstance is the noise with which they are accompanied. The instruments used are clarinets (sometimes formed of silver and brass, but generally of wood with reed pipes), horns, shells, cymbals, drums, and gongs.

The garments of the people consist of a long loose robe

which wraps round the body, and is secured in its position by a leather belt round the waist. A legging of broadcloth is attached to a shoe made generally of buffalo hide. The diet of the great body of the people is the most miserable it is possible to conceive; they are restricted to the refuse of wretched crops of unripe wheat and barley, and their food consists chiefly of cakes made from these grains very imperfectly ground. The food of the superior classes consists of the flesh of goats, swine, and cattle, and of rice imported from the Duars. The mode of preparing their food is most artificial and rude, with little attention to cleanliness and still less to the quality of the meat they consume. They are very fond of tea, and use it in large quantities. All classes are very much addicted to the use of intoxicating liquors. The character of the Bhutias, by the nature of their institutions, stands low in the social scale. Every element of deterioration is comprised in their government, both secular and spiritual. Their energies are paralyzed by the insecurity of property, their morals are degraded, and their numbers reduced by the unnatural system of polyandry and the excessive prevalence of monastic institutions.

Previous to 1865 the country enjoyed a degree of independence, and is nominally independent still. For some time, however, prior to 1865 the inhabitants availed themselves of a number of duars or passes, which constituted their most fertile tracts of country, to make depredatory inroads upon British territory. Attempts on our part to arrange matters in a conciliatory manner were met with insolence and treachery, and the Indian government in 1865 seized the duars, which are now prosperous British districts. An allowance, however, of about £5000 per annum is made to the rajahs during good behaviour.

BIAFRA, BIGHT OF, is that part of the Gulf of Guinea which lies E. of the mouth of the Niger. It extends from Cape Lopez, in about $1^{\circ} 12'$ S. lat., to Cape Formosa, which divides it from the Bight of Benin. The shores of the bay probably extend more than 800 miles.

The N. shores of the Bight, nearly to the mouth of the Old Calabar River, are flat and low, belonging to the delta of the Niger. The Old Calabar is the first river E. that has no communication with the Quorra. To the S. of the Rio del Rey the country rises into mountains which attain a considerable height; they are called the Cameroon Mountains, and contain a peak which, it is said, rises to 13,000 feet above the level of the sea. S. of this mountain region runs the river Cameroon, of which very little is known; and S. of the river extends a mountainous country which, however, leaves a low and often swampy tract along the shore, especially to the south of Cape St. John. S. of this cape the coast forms two bays—Corisco Bay and the Bay of Gaboon. These are divided from one another by a narrow tract of land which terminates in Cape Clara, $0^{\circ} 18'$ N. lat. Into the northern of these bays the Rio d'Angra, called by the natives Moolinda, empties itself. The southern bay between Cape Clara and Sandy Point may be considered as the estuary of the Gaboon.

The Gaboon River is the only place on the coast of the Bight which has been frequented by European vessels, and of which we have obtained more particular information. Its estuary at its junction with the sea is 18 miles wide. About 23 miles from the sea are two islands, and E. of these the estuary grows still wider, so that it here is 30 miles across; but it soon narrows to about 12 miles, which breadth it preserves to its eastern extremity, about 45 miles from the sea, where it receives two large rivers. The places most resorted to by European traders are George's Town or Naingo, on a creek of the estuary of Gaboon, about 45 miles from the sea; and Mayumba, which is on the coast about midway between the Gaboon and Congo rivers. The principal exports are red wood and ivory, both of which are in abundance. The climate of the Bay of

Gaboon is very unhealthy, in consequence of the intense heat. Wild animals are numerous, especially elephants, orang-outangs, and other kinds of monkeys. Chameleons are common. Of domestic animals only goats and fowls are reared, and in the interior dogs also, which are used as food. Cotton and tobacco grow spontaneously; the caoutchouc-tree is common, and likewise a species of butter-tree, and the tree from which the kola-nuts are gathered. Mangroves are found on the banks of the creeks and rivers, and they even grow some yards from the bank in the water, where their lower branches are frequently covered with oysters. The palm-wine tree is plentiful. Like most part of the countries inclosing the Gulf of Guinea, the woods are so covered beneath with shrubs and plants that they seem impenetrable, and are infested with reptiles and other noxious creatures.

BIALYSTOK, a province of Western Russia, situated between $52^{\circ} 3'$ and $53^{\circ} 38'$ N. lat., and $22^{\circ} 30'$ and $24^{\circ} 12'$ E. lon., is bounded N. and W. by Poland, S. and E. by the government of Grodno. Its area is 3424 square miles, and its population 265,944. It was formerly included in Poland, but was seized by Russia under the third treaty of partition in 1795. The surface is generally level; the soil is in most parts light and sandy, but adapted to agricultural purposes, and in the southern districts, where there is an intermixture of sand and loam, it is highly productive. The province is divided into four circles, Bialystok, Drohiczyn, Sokolka, and Bielsk. The first three contain large forests. The principal river is the Western Bug, which bounds the province on the south-west, and being navigable, connects it with Warsaw and Danzig by means of the Vistula. The Bober, or Bobr, separates the province from Poland on the N.W. This river runs with an extremely slow current, through large swamps and morasses, and inundates the adjacent country every spring. The climate is healthy, except in those parts where the exhalations from the swamps infect the air. The inhabitants are principally employed in husbandry. Rye, wheat, buckwheat, pease, hemp, and flax are grown extensively. Game and wild animals, particularly wolves, foxes, deer, and boars, are plentiful; the breed of the horses is good; the sheep are of the black species. The rearing of horned cattle is so ill conducted that milk is scarce, and the inhabitants are obliged to import both butter and cheese. Large quantities of timber, together with some tallow, black wool, wax, and honey, are exported. The province yields no minerals except freestone, clay, limestone, and a little iron, which is consumed in the country.

BIALYSTOK, the capital, lies on the little river Bial, in $53^{\circ} 7'$ N. lat., $23^{\circ} 18'$ E. lon.; population, 16,985. It has a spacious market, a palace and park, once belonging to the counts of Potocki, but at present to the town, and called the Versailles of Poland; two churches, two chapels, a convent, a gymnasium, lying-in institution, &c. It is regularly built, several of the streets are broad, at right angles to one another, paved, and bordered with lime-trees. The houses are mostly built of wood. There are manufactures of leather, soap, woollens, hats, and tallow.

BIARRITZ, a maritime village of France, in the department of the Basses Pyrénées, 5 miles S.W. of Bayonne. The Countess de Montijo and her daughter Eugénie, afterwards empress of the French, resided here till the marriage of the latter in 1853, and it afterwards became a favorite summer residence of the emperor and empress. In 1850 it was quite an insignificant hamlet, and no wheeled carriage had ever reached it in consequence of the sandhills; but there is now a railway to it, and some first-class hotels in the town. French, Russian, German, and English families visit it during the season. There is, in fact, a considerable English community here, and a new English church was built in 1877. The place has naturally neither trees nor grass, but has the charm of

seclusion, a delightful climate, and a fine sandy beach for bathing. The population is 8500.

BIAS, a native of Priene, and one of the seven philosophers called "the Wise Men of Greece." It appears from Herodotus (i. 170) that he was living at the time of the conquest of Ionia by the Persians under Cyrus, B.C. 544-539.

The "Seven Wise Men" were not philosophers in the sense in which the word is commonly used; they seem merely to have been men of high repute for moral, political, or legislative knowledge. The few remains of their wisdom are in the form of short pithy maxims, generally in verse, with the sentiment of which we are now so familiar as to regard them as self-evident propositions, and are therefore likely to underrate the merit of those who first enunciated them. Of this class of sayings we find the following, among others, ascribed to Bias:—Being asked, "What is difficult and unpleasant?" he replied, "To bear with nobleness the changes from better to worse." He said that it was better to arbitrate between your enemies than between your friends, because one of the enemies was sure to turn to a friend, and one of the friends sure to turn to an enemy. "Life should be so ordered as if men were to live a long time and a short one." "Be slow to set hand to work, but what you begin finish." "Be quiet," he said to some inquisitive sailors who in the midst of a tempest were calling on the gods for help, "Be quiet, lest the gods discover you are here." "Take wisdom as the provision for travelling from youth to age, for of all possessions that sticks the closest." His death took place after he had pleaded a cause successfully, in extreme old age. His fellow-citizens gave him a splendid funeral at the public expense, and consecrated a temple to him. Bias is one of the speakers in the "Symposium" of Plutarch. (Diog. Laert., "Bias.")

There are three collections of the sayings (*gnōmāi*) of the Wise Men; two are attributed to Demetrius Phalereus and Sositades; a third is by an unknown author. Diogenes Laertius and Plutarch have preserved several apophthegms not found in these collections. The first two collections are preserved in the editions of Stobæus; the third was printed by the elder Aldus at the end of his "Theophrastus" (1495). The completest collection of these sayings is by Joh. Conr. Orelli, in the first volume of his "Moralisten."

BIERACH, a bailiwick in the Württemberg circle of the Danube, which has an area of about 151 square miles, and 25,300 inhabitants. The chief town, Biberach, is situated in the valley of the Riess. It is surrounded by walls, with towers and a ditch; contains four churches, two public schools, three elementary schools, a well-endowed hospital, and has a large corn market. The number of inhabitants in 1883 was 7300. Independently of agriculture and grazing, the inhabitants find profitable employment in weaving fustians and linens, tanning, paper-making, brewing, and bleaching. The mineral waters of Jordsand are at a short distance from the town. It is the birthplace of Wieland; and in 1796 the French, under Moreau, defeated the Austrians in its vicinity.

BIBLE, THE, the name given to the collection of Jewish and Christian writings recognized as sacred by the Christian Church. It is derived from the Greek *ta biblia*, "the books," and was first applied to the books of the Old and New Testament by Chrysostom in the fifth century. As these books were used constantly in the services of the church, and continually referred to in the public teaching and in the controversies that arose, the term "the books" was appropriated exclusively by the sacred writings, and this title has passed into nearly all the European languages.

In the New Testament itself the books of the Old are variously referred to as "the Scripture," "the Scriptures," "the Holy Scriptures," "the law of Moses," "the prophets," and "Moses and the prophets." In 2 Cor. iii. 14, the law of Moses is spoken of as being "the old covenant," and in

Heb. ix. 1, 15, reference is also made to "the first" and to a "new" covenant. In course of time these terms became applied to the books of the Hebrew scriptures and to those of the Christian canon, and in the Latin form of "Testamentum" passed into the current phraseology of the church. With the exception of portions of the Books of Daniel and Ezra, and one verse in Jeremiah, the whole of the Old Testament was written in Hebrew, the portions excepted being in the vernacular Aramaic or Chaldee. The whole of the New Testament as we have it was written in Greek. Eusebius ("Eccles. Hist." 3, 36) says that Papias affirms that Matthew wrote in the Hebrew dialect "the oracles" (*ta logia*); and some of the fathers have more explicitly attested that Matthew wrote a Gospel in Hebrew for the Jews, his countrymen. That such an opinion prevailed in the early church cannot be doubted, but there does not appear to have been any authentic tradition to this effect. The whole question is involved in difficulty, but most modern scholars incline to reject the assertion as not supported by sufficient evidence.

History of the Old Testament.—There is perhaps no subject that has excited more interest or awakened more earnest discussion in modern times than that of the origin of the books of the Sacred Scriptures, nor is there perhaps any subject on which the opinions of scholars are more widely at variance. The questions as to whether those books of the Old Testament which bear a title were written by the prophet indicated, and as to the authorship of those books that were written anonymously, have received the closest investigation from some of the foremost British and German critics, and though many points of inquiry yet remain veiled in obscurity, the old traditional ideas on these matters must be partially modified, and in some cases given up altogether. To indicate even in outline the various theories that have been propounded would be impossible within the limits of this article, but the reader is referred for further information to the headings of the various books. In this place we can only refer to those points which are now generally accepted among biblical scholars.

By the Jews the books of the Old Testament were divided into three portions:—

1. "The Law" (*Torah*), consisting of the Pentateuch, or the five books attributed to Moses.
2. "The Prophets" (*Nebiim*), containing the historical books of Joshua, Judges, 1 and 2 Samuel, 1 and 2 Kings, and the prophetic works of Isaiah, Jeremiah, Ezekiel, and the twelve minor prophets.
3. "The Scriptures" (*Ketubim*), consisting of the Psalms, Proverbs, Job, "the five rolls" of Canticles, Ruth, Lamentations, Ecclesiastes, and Esther, and the books of Daniel, Ezra, Nehemiah, and 1 and 2 Chronicles.

The foundation of the whole series is to be found in the first division, and that Moses was the author of this portion is the testimony of all tradition, both Jewish and heathen; but in modern times this tradition has been called in question by eminent scholars in Germany, France, and Holland, as well as in Great Britain, who have subjected the language and contents of these books to a careful and minute investigation, and it is now generally admitted that their present form must have been given at a much later period than that of Moses; but the critics by no means agree among themselves as to date and authorship. It seems certain that the priests possessed a series of written laws from a very early period, and in the account of the reign of Josiah, shortly before the Captivity, we read of the finding of a book of the law during the restoration of the temple, the contents of which appear to have been unknown to both the king and the people, but which they recognized as being of divine authority, and as having been forgotten and neglected. At the close of the Captivity, also, we find Ezra described as "a ready scribe in the law of Moses" (Ezra vii. 6); and in Neh. viii.

an account is given of a public reading of the law in Jerusalem at which the meaning had to be given to the people, who now spoke a different language.

It is to this period that a very old tradition recorded in the Talmud ascribes the gathering together and composition of the books of the Old Testament. That there was at this time a collection made of those writings which had been preserved, some of which were retained in their entirety, and that a connected narrative was compiled from certain fragmentary annals and other documents, seems very probable. It would also appear that after the addition of the books of Nehemiah and Ezra, and the placing of Daniel and Esther in the canon, little in the way of alteration or addition was effected by the Palestinian Jews for several centuries preceding the time of Christ. Those of Alexandria, however, made a translation of the books enumerated into the Greek language—a proceeding regarded with great dislike by the Jews of Palestine—and included with them the books of the Apocrypha. [See SEPTUAGINT.] The first authentic list of the books of the Old Testament is that given by Josephus, who enumerates twenty-two as “divine”—viz., *five of Moses, thirteen of the prophets, and four hymns and directions of life*. The number twenty-two was adopted by the Jews in order to correspond with the letters of their alphabet, and in order to accomplish this, Judges and Ruth, 1 and 2 Samuel, 1 and 2 Kings, 1 and 2 Chronicles, Ezra and Nehemiah, Jeremiah and Lamentations, and the twelve minor prophets, were probably all reckoned as single books. On the other hand, as the Greek version of Alexandria was most commonly used in the early church, the apocryphal books came to be also accepted, and are occasionally cited, with the same formula as the canonical scriptures; nor was it until some centuries had elapsed that the Eastern Church adopted the views of the Palestinian Jews, and distinguished between the apocryphal and canonical writings. The former were still retained and used by the Western Church, though differences of opinion were tolerated as to their authority up to the Council of Trent in 1545 A.D. The Protestant reformers had decided to accept only those books regarded as canonical by the Jews, and the Council, in opposition to the new movement, not only declared all the books of the Apocrypha to be deserving of equal veneration with the rest, but also pronounced an anathema against all who should refuse so to receive them. At the present time, therefore, the Christian Church is divided so far as the books of the Old Testament are concerned, the Roman Catholic Bible retaining, and the Protestant Bibles excluding the Apocrypha. The Eastern Churches, for the most part, agree with the Jewish canon.

Text of the Old Testament.—As already stated, the books of the Old Testament, with the exception of parts of Jeremiah, Ezra and Daniel, were originally written in Hebrew, and although the spoken language of the people was changed on the return from the Captivity, they still continued to use the Hebrew for the sacred writings. As the number of synagogues increased copies of these scriptures were multiplied by the professional scribes, who undoubtedly exercised great care in the performance of their work, the preservation of the exact words being regarded as being of the greatest importance. On this point Josephus remarks that “during so many ages no one has been so bold as either to add anything to them, to take anything from them, or to make any change in them;” and this he gives as being the opinion of the Pharisees as well as his own. When, however, we consider the difficulties that must of necessity arise in the multiplication of manuscripts by means of the pen alone, it will be seen that it was practically impossible for mistakes and differences of reading to be prevented. In copying from dictation the ear would be frequently deceived, and in copying from a manuscript the writer would be exposed to the difficulties arising from obscurity in the writing before him, the defacements of age

and use, the difficulties caused by abbreviation marks, by marginal notes, which were only distinguished by little marks at the beginning and end of the passage, and from the temptation to amend the text by substituting a modern for an obsolete word, or by rearranging a sentence. The fact that the ancient manuscripts were written without vowel points, without stops, and often without even the division of the letters into words, would also add to the difficulties of the transcriber; and we find that errors and differences, arising from all these and from other causes also, are to be found existing in the Hebrew text of the Old Testament. These differences were noticed at a very early period by the Jews, and a very careful and laborious revision of the existing manuscripts was made by the Jewish doctors of the school of Tiberias, generally known as the Masorites, in the period between the sixth and eleventh centuries B.C. To these students we are indebted for the existing text of the Old Testament, and they also first introduced the vowel points and accents, which have ever since been used. Their labours extended to the most minute particulars respecting the sacred text; they counted the words of each book and also the number of letters. They calculated and recorded the middle word of each book and the middle letter, and also the middle word and letter of the whole. They also counted the number of times the different letters of the alphabet were used for each book and for the whole Bible. The result of these labours has been that the text has been preserved from that time with very great accuracy, and the printed Hebrew Bible at present in use is derived from the revision of the school of Tiberias. For a long time it was generally believed that all the Hebrew manuscripts were the same, and this view prevailed until about the middle of the seventeenth century, when it was called in question by Capellus and Bishop Walton, and the various manuscripts in existence began to be examined and compared by critical scholars. As a result various editions of the Hebrew text were published, among the best being those of Optatus, published in 1709, and that of Van der Hooft in 1705. Dr. Kennicott, taking the text of Van der Hooft as a basis, compared it with 692 different manuscripts and authorities, and his edition of the Hebrew Bible, printed at Oxford in 1776–80, gave the result of his labours. This work, in two volumes folio, contains a list of 200,000 various readings, but nearly the whole are of a minor character, and very few affect the sense of the text. The work of examination was also greatly assisted by the labours of De Rossi of Parma, who collated 751 manuscripts, 734 of them for the first time, and published the results in five volumes, 1784–88. The work has been continued by modern scholars, the text being compared also with the translations of the earliest periods, but the work can by no means be regarded as complete at the present time. Most critics now agree in admitting that there are errors, mistakes, and interpolations in the existing text. It is also evident that the translators of the Septuagint, the Syriac, the old Italic, and the Vulgate, had before them texts differing to a certain extent from that generally received at the present time; but while it cannot be contended that the present text is that which existed after the compilation of Ezra, there is good reason for believing it to be substantially the same, and with the exception of three or four passages there is no reason for thinking that it has ever been designedly corrupted or altered. The manuscripts of the Old Testament are all of comparatively modern date, and are all derived from the original Masoretic copy. The two oldest are those in the Imperial Library at St. Petersburg, one of which contains the prophets, and dates from the years 916–917, and the other, written or completed in 1009, contains the whole of the Old Testament.

History of the New Testament.—Unlike the Old Tes-

tament, the books of the New are everywhere the same throughout Christendom, the Protestant, Greek, and Roman Churches all accepting the same list of sacred books, and this unanimity may be regarded as dating from the close of the fourth century. There had existed in the earlier periods certain differences of opinion as to the canonicity of some of the books now received, and one or two of the writings now regarded as apocryphal had been considered as being of divine authority. Thus Origen, in his list of the canonical books, included the Epistles of Clement, of Barnabas, and the Shepherd of Hermas among the number; and, on the other hand, some of the early Christian authorities regarded the Epistles of James, Jude, 2 Peter, and 2 and 3 John, with the Apocalypse, as wanting apostolic authority. There would appear to have been perfect freedom of inquiry, and an earnest examination of the evidence for and against each book at this period, and as a result the present list of books was accepted; and the subsequent investigations of Christian scholars have all tended to confirm the selection made. Of the books of the New Testament, Eusebius, who lived at the beginning of the fourth century, enumerates the four Gospels, the Acts of the Apostles, the Epistles of Paul (among which he reckoned the Epistle to the Hebrews, as he elsewhere speaks of them as fourteen), 1 Peter, and 1 John, as being everywhere received as genuine; the remaining books he characterizes as controverted—i.e. they were accepted by many and were used in the church, but the question as to their authority was still discussed; while he divides the apocryphal writings into two classes—those that were harmless and those that were impious. By the Council of Laodicea, 360-364, it was decided that the uncanonical books should no longer be read in the public services of the church, and a list of the canonical books was given, which includes all those of the present New Testament, with the exception of the Apocalypse; but by the Council of Carthage, held about thirty years later (397) this also was included with the rest. There are an immense number of manuscripts of the New Testament in existence, and some of them possess a very high antiquity. The most valuable and important of these are the Sinaitic, discovered by Dr. Tischendorf, and believed by him to date from the fourth century; the Alexandrian, dating from the fifth century; the Vatican, dating from the fourth century; and the Codex Ephraemi manuscript, and the Codex Bezae Cantabrigiensis manuscript, from the fifth century. The earliest manuscripts were written in uncial (inch or capital) letters, the writing running across the page without any division into words or sentences; and this style of writing continued in use until the ninth century, when it gave way to the cursive style of writing by which in the following century it was succeeded. Of these manuscripts 127 uncial and 1460 cursive have been examined by critical students, and about 2000 manuscripts are known to be in existence. As in the case of the Old Testament the multiplication of manuscripts has given rise to many various readings, but the large number in existence, and the great antiquity of those we have referred to, afford great facilities for getting a correct or nearly correct version. Most of the various readings leave the sense of the passage untouched, and none of them affect any Christian doctrine. It has been computed "that out of the 7959 verses of the New Testament there are not more than ten or twelve various readings of great importance, and these affect not the doctrines of Scripture, but only the number of proof passages in which the doctrines are revealed."

Translations of the Bible.—No complete translation appears to have been made in the Saxon times into the language then spoken in England. Bede translated portions of the Scriptures. No evidence can be produced that the whole of the Scriptures was by any person rendered into Saxon. But of the more important portions of the Saxon versions still exist in manuscript. At the Reformation,

when the work of translating the Scriptures met with opposition from the church, it was a point of some importance to draw the public attention to the fact that versions into the vernacular tongue were no novelties in England. It was with this view that Parker, archbishop of Canterbury, encouraged Foxe, the writer of the Martyrology, to prepare an edition of the Gospels in Saxon, which he did, and published it in 1571.

Devout persons seem to have employed themselves in rendering portions of the Scriptures into the language spoken in this country, when what we call Saxon was becoming what we now call English. It is thought that the whole of the Scriptures had been translated in the thirteenth century. There are two persons, both of the age of King Edward III., who are said to have executed this work. The one, John de Trevisa, a native of Cornwall, was educated at Oxford. Caxton, writing not a century after the time, says that he translated the Holy Scriptures; this is, however, now matter of uncertainty. But there is no doubt that Wickliffe either translated the whole Bible or gathered together translations which made an English Bible. Many copies of this volume were made about the time when it was completed, which was about a century before the introduction of printing into England. Wickliffe died in 1384. The New Testament from this version has been several times published.

It is to the resistance which was made by the ecclesiastical authorities of the time that we are to attribute the remarkable fact that, though the art of printing was introduced into England in or about 1474, yet no English Bible or Testament was printed till 1526, and then at a foreign press.

To William Tyndal we owe a translation of a large portion of the Scriptures into the English tongue, next in antiquity to Wickliffe's. Tyndal was acquainted with Luther, whose advice and assistance he is reported to have had in his translation. He lived much abroad, and before 1526 he had completed an English version of the New Testament. Of this he printed in that year two distinct editions—one in quarto at Cologne, another in duodecimo at Antwerp. Perfect copies of either of these editions are not known. Tyndal proceeded in his work of translation, and not less vigorously in superintending successive editions of his New Testament through the press. They were bought up and burned in England; but this only supplied him with the means of printing other editions with such corrections and improvements as were suggested to him. He is said to have also printed a translation of the Pentateuch, and it is certain that he did translate those five books of Moses, and also many other books of the Old Testament. He did not, however, commit to the press any complete translation of the whole Scriptures. Tyndal was put to a cruel death in 1536, near Antwerp, where his translation first appeared.

Another person who at that early period engaged in the work was Miles Coverdale, a friend of Tyndal. He produced a complete English Bible, composed of Tyndal's translations, as far as they went, and his own. This was published in 1535, and it has the honour of being the first complete edition of the Bible in English. As a translation it is much inferior to that of Tyndal. Two years later Tyndal's version, revised by his friend John Rogers, was published under the assumed name of Thomas Matthews, from which it became known as *Matthews' Bible*. In 1539 another revision of Tyndal's text was published, to which Crammer wrote a preface. This was a large volume for the use of churches, and was known as the *Great Bible* or *Crammer's Bible*. The version of the Psalms given in this edition is still used in the Book of Common Prayer. In 1557 another version was published at Geneva by some English ministers who had fled there on account of the persecutions that had been instituted by Queen Mary. This is known variously as the *Geneva Bible* or the *Breeches*

Bible, from the peculiar rendering of Gen. iii. 7. The Bishop's Bible, prepared under the superintendence of Matthew Parker, archbishop of Canterbury, was issued at London in 1568, and the text of this formed the basis for the revision made under King James I. There was another version also published about this time, that is worthy of note, viz. that published at Rheims in 1582 of the New Testament in English, taken from the Vulgate, for the use of Roman Catholics. This was followed in 1609-10 by a version of the Old Testament also taken from the Vulgate, and published at Douay, the two versions united forming the *Douay Bible*, which is the authorized version for the Roman Catholic Church.

By the labours of her industrious scholars England was now placed in the possession of several excellent versions of the Scriptures; but it was felt on all sides that the work was still incomplete, and a translation which would command general acceptance was still a desideratum.

Early in the reign of King James I. there was a conference of divines of different opinions at Hampton Court, for the settling of the peace of the church. In this conference much was said concerning the imperfections of the existing translations of the Scriptures. The king himself, who was often present at these meetings, expressed a strong opinion on that point of the debate. "I wish," said he, "some special pains were taken for a uniform translation, which should be done by the best learned in both universities, then reviewed by the bishops, presented to the Privy Council, and lastly, ratified by royal authority, to be read in the whole church, and no other." Out of this speech arose the present English Bible; for the suggestion soon ripened into a resolution. Fifty-four of the persons in that age most distinguished for that particular species of learning which such a duty required were selected for the work, according to the king's suggestion; finally, forty-seven of them undertook it. They divided themselves into six independent classes, to each of which a certain portion of the work was assigned. Each person in the class was to produce his own translation of the whole committed to them, and these several translations were to be revised at a general meeting of the class. When the class had agreed upon their version it was to be transmitted to each of the other classes, so that no part was to come out without the sanction of the whole body.

Two of the classes sat at Westminster, two at Oxford, and two at Cambridge. The instructions which they received from the king were, that they should adhere to the Bishops' Bible (first printed in 1568), which was then ordinarily read in the churches, making as few deviations from it as possible. They were, however, to use the other versions, and to consult the translations which had been made into other modern languages; and they were to keep in the old ecclesiastical words, such as church, &c. When a word had divers significations, "that should be kept which had been most commonly used by the ancient fathers, being agreeable to the propriety of the place, and the analogy of faith." No marginal notes were to be used, except for the further explication of some Greek or Hebrew word. References to parallel passages might be given. They were to call in the assistance of any learned man who was known to have made this subject his study. They were employed upon the work for three years, namely, from 1607 to 1610, and it was printed in the following year.

The general accuracy of this translation, and the nervous force and beauty of the language employed, soon gave it the preference over all other editions, and caused it to be everywhere used as the English Bible. From time to time, ever since its publication, scholars called attention to various inaccuracies and errors to be found in it, and corrections without number were suggested, but so strong was the feeling in its favour that it remained without alteration for a period of 270 years. It called forth the highest eulo-

giums from scholars and writers, both foreign and English, from among which we may select that to be found in the preface of the revision of 1881. "We have had to study this great version carefully and minutely line by line, and the longer we have been engaged upon it the more we have learned to admire its simplicity, its dignity, its power, its happy turns of expression, its general accuracy, and we must not fail to add the music of its cadences, and the felicities of its rhythm."

It was the possession of these qualities that enabled the Authorized Version to maintain its position so long without amendment, and which caused many earnest and good men to resist all suggestions for a further revision; and it was not until the middle of the present century that any earnest and united effort was made in that direction. These efforts took shape, in the first instance, in an appeal made to the Southern Convocation by Canon Selwyn, in which he sought to obtain the support of the Convocation in a prayer to the sovereign to grant a royal commission for the purpose. In this he was unsuccessful, but public attention was called to the subject, and private efforts were made to supply the want that had been indicated, or at least to show that it was possible to do so. It was pointed out by those in favour of the movement that most important documentary evidence had been discovered since the preparation of the Authorized Version, by which a flood of light had been thrown upon the original text. The labours also of British and Continental scholars in the department of textual criticism had furnished a mass of material for the use of translators, of which the scholars of 1611 were altogether destitute. The English language had also changed to some extent during the period which had elapsed, and many words had become obsolete and ambiguous. These considerations finally prevailed, and in 1870, at the Convocation of Canterbury, the then Bishop of Winchester moved, and the Bishop of Gloucester and Bristol seconded the following resolution:—

"That a committee of both houses be appointed, with power to confer with any committee that may be appointed by the Convocation of the Northern Province, to report upon the desirableness of a revision of the Authorized Version of the New Testament, whether by marginal notes or otherwise, in all those passages where plain and clear errors, whether in the Greek text originally adopted by the translators or in the translation made from the same, shall on due investigation be found to exist."

The resolution was afterwards extended, on the motion of the Bishop of Llandaff (Dr. Ollivant), seconded by the Bishop of St. David's (Dr. Thirlwall), to the Old Testament; the necessary words were inserted; the practically unanimous assent of the house was given to the amended resolution, and a committee appointed. The matter was now fairly taken in hand, and finally an executive committee was appointed to undertake the work.

This second or, so to speak, executive committee then seriously took the work in hand. They first met on 25th May, divided themselves into two bodies, or, as they were afterwards called, companies, the one for the Old Testament, the other for the New, and proceeded to the difficult and delicate task of choosing colleagues, and of framing general and special rules for the carrying on of the work. The labours of the committee were lightened by the fact that those originally most interested in the cause had already carefully collected the names of scholars who were judged to be most likely to aid the undertaking, and, when the committee met, had a sufficiently full list to present to it. The general and special rules had also been prepared beforehand in draft by the Bishop of Gloucester and Bristol, and were accepted with but slight modifications.

Every effort was made to secure the assistance of the most eminent scholars of the Presbyterian and Nonconformist Churches, so as to prevent any fear of the work undertaken being biased by sectarianism, and these efforts

of the committees were heartily responded to by the different bodies to whom the appeal was made. Communications were also entered into with the churches of America, and their co-operation invited. The result of this was that towards the close of 1871 two committees were formed in America to communicate with the two English companies on the basis of the rules that had been already laid down for the revisers in this country. Very soon afterwards portions of the first revision, that had by that time been finished in England, were transmitted to America, and a system of communication fully established. The work then went on continuously in both countries, the English companies revising and the American committees reviewing what was thus revised and returning their suggestions, both as regards the first and the second revision, to the two companies at Westminster. The work thus undertaken of necessity occupied considerable time, and it was not until May, 1881, that the first instalment was published—viz. the complete New Testament, with the revisers' preface and notes. In the preface a full and interesting account is given of the methods adopted by the committee, and the rules by which they were guided in their undertaking. With regard to the work itself, it has received the approval of many eminent scholars, Continental as well as English, and on the other hand it has been very sharply criticised in many quarters. A considerable time must elapse before its merits, in comparison with the older version, can be fully appreciated. It is certainly a somewhat different production from that which was anticipated when the committee first commenced their labours. In general the British and American revisers were agreed as to the rendering to be adopted, but in regard to some readings and renderings a difference arose, and as the Americans attached importance to their own view a list of the readings and renderings preferred by them is appended to the book. The injunction of Convocation, to the effect that the style of the language employed in the existing version should be closely followed in the revision, was loyally carried out, and the changes admitted were only such as were held to be necessary to represent the true meaning of the Greek, but they nevertheless amount to between eight and nine changes for every five verses in the Gospels, and to about fifteen for the same proportion in the Epistles.

The second portion, comprising the whole of the Old Testament, was issued in 1885. Only time can reveal whether it will take the place of the old version, but its great value and usefulness are unquestionable.

BIBLE SOCIETIES are associations, supported by voluntary contributions, for the general circulation of copies of the Sacred Scriptures. Previous to the formation of the British and Foreign Bible Society, which is now the principal one, the associations in Great Britain which included among their objects the circulation of the Bible were:—1, The Society for the Propagation of the Gospel in New England, originally incorporated by an ordinance of Parliament in 1649, and reincorporated in 1661, after the Restoration; 2, the Society for Promoting Christian Knowledge, established in 1698; 3, the Society for the Propagation of the Gospel in Foreign Parts, established in 1701; 4, the Society in Scotland for Propagating Christian Knowledge, incorporated in 1709; 5, the Society for Promoting Religious Knowledge among the Poor, established in 1750; 6, the Bible Society, established in 1780, for the purpose of circulating the Scriptures among Soldiers and Sailors exclusively; 7, the Society for the Support and Encouragement of Sunday Schools, established in 1785; 8, the French Bible Society, established in London in 1792, for the purpose of distributing copies of the Scriptures in France.

The most important of the above associations, in fact the only one which could attempt the circulation of the Bible on a large scale, was the Society for Promoting

Christian Knowledge. Its efforts, however, do not appear to have been commensurate with the increasing demand. This led to the establishment, in 1803, of the Society for Promoting a more extensive Circulation of the Scriptures both at Home and Abroad; but which, at a public meeting held in March, 1801, was changed to that of the British and Foreign Bible Society, of which the object was declared, in their resolutions then passed, to be to encourage a wider diffusion of the Holy Scriptures. A controversy relating to the circulation of the Apocryphal works along with the Canonical Scriptures, led to the passing of a resolution, in 1826, that they should be afterwards excluded. [See APOCRYPHA.] The operations of the society have been constantly extending. From the date of its establishment to 1851 it had issued 24,250,000 copies; in 1863 the number had increased to 43,000,000; in 1867 to 52,600,000; and in 1883 to over 93,000,000. Its annual income is about £200,000. It has published translations of the Scriptures (either complete or in portions) in almost every European and many Eastern and African languages.

Two other societies in the United Kingdom deserve notice. In 1860 the Edinburgh Bible Society, the Glasgow Bible Society, and a number of small societies, were united under the title of the National Bible Society of Scotland, and both its circulation and income have since shown steady progress. The society's operations are also extended widely in different parts of the whole world.

The Hibernian Bible Society was instituted in 1806. The object of this society is to encourage a wider circulation of the Holy Scriptures, without note or comment, in Ireland.

The American Bible Society was established in 1817, and now ranks next to the British and Foreign Bible Society of England. It has its headquarters in New York, and has about 1500 auxiliary societies in connection with it. Its annual income is over £100,000, and every year it circulates about 300,000 Bibles and nearly twice as many New Testaments. There are some Bible Societies on the continent of Europe, but of no great importance.

BIBLIOGRAPHY may be defined to be the science of books, regarded simply as such. It comprehends the facts of the subject and class of the work, of its authorship and subsequent history, of the number of editions it has passed through, of the printer and publisher of each, and of its date in respect both of time and place, of the form or size, the quality of the paper, the number of pages, the typographical character, the number and description of the plates, the comparative completeness, correctness, and rarity, and all other external peculiarities or distinctions of each edition. In Germany, in Italy, in France, and also in our own country, works in all the departments of bibliography have, within the last three centuries, been produced in such numbers that the mere enumeration of their titles would make a bulky volume. The most numerous class of bibliographical works are catalogues of books.

Some *Catalogues Raisonnés* (as catalogues are called by the French, in which the books are disposed into classes according to their subjects) have been printed of public libraries. The greatest work of this description is probably that of the French "Bibliothèque Royale," begun in 1730, and finished in ten volumes folio, in 1753. There are printed catalogues of most of the public collections of books in this country; but they are chiefly alphabets of titles. A higher description of catalogues exists in those accounts, not of particular collections, but of books generally, or of certain classes of books, arranged with reference either to their subjects, their dates, their authors, or their titles. One of the earliest attempts in this way was that of Conrad Gesner, in his "Bibliotheca Universalis," published in one volume folio, in 1545. In this catalogue the works are arranged according to the names of the authors; but, although designated a universal library, it is confined to books in the Greek, Latin, and Hebrew languages.

In a few cases attempts have been made to present catalogues of all the works written in some single language, or by the authors of some single country. A much more numerous class of catalogues enumerated all the books written either in some one language, or in all languages, upon a particular department of knowledge.

Of books of the former kind we may mention "La France Littéraire," a catalogue of the books written in the French language during the eighteenth and nineteenth centuries. It was commenced by J. M. Quérard in 1827, and afterwards continued by Louandre, Bourquelet, and by Lorenz, the last volume being published in 1871. Of German books there is the valuable catalogue of Heinisius, "Allgemeines Bucherlexicon" (1812-56); of Italian the "Lerie de Testi" of Gauba (1839); of Spanish the "Bibliotheca Hispana Vetus" and "Bibliotheca Hispana Nova" of Antonio (1783-88); and for Holland and Belgium the "Bibliotheca Belgica" by Foppens (1739).

Another subdivision of this class of bibliographical works consists of catalogues of all such books as have been published up to a certain date posterior to the invention of printing, or of those that have appeared in some particular age, or that have issued from some particular press. To these works are to be added many others, which proceed upon a principle of selection. Probably no publication has contributed so much to make the study of bibliography popular as the elegant and judicious performance of De Bure, entitled "Bibliographie Instructive."

BIBULUS was a favorite name of the great Calpurnian clan (*gens Calpurnia*) of the ancient Romans. The most noteworthy is **LEVIUS CALPURNIUS BIBULUS**, who opposed Caesar in the interests of the conservative aristocratic party. He found himself, when elected consul as Caesar's colleague in B.C. 59, so helpless in the powerful grasp of his opponent that he eventually refused to sanction any public business, and retired to his house, so that the wits of Rome declared the consuls were Julius and Caesar for that year. Bibulus naturally drifted into alliance with Pompey, and it was greatly through his influence that Pompey was elected sole consul in B.C. 52. The celebrated crossing of Caesar into Greece was made in spite of Bibulus, who was in command of the fleet stationed in the Adriatic to intercept him. Enraged at his failure Bibulus burned the empty ships which he captured returning to Italy after landing their troops, and massacred their crews. Caesar now held the eastern coast, and the fleet of Bibulus suffered great hardship during the winter. Sickness broke out, and the commander himself was one of the victims, B.C. 48. Bibulus was a man of some rank, and at one time held sway over one of the great Eastern provinces, but certainly would not have obtained such general recognition had not chance continually thrown him in the path of the great dictator. He was son-in-law of Caesar's opponent Cato (M. Porcius Cato of Utica), great-grandson of the famous censor.

BICE. Two pigments which have been in use from a very early period are known by this name. They are of a blue and green colour respectively, and are both prepared from carbonates of copper. They are also made artificially, the blue being known as "Humbio" or "mineral" blue, and the green as "mountain" or emerald green. The colours prepared from the native carbonates are the best.

BICESTER, a market-town of Oxfordshire, 13 miles N. by E. from Oxford, and 66½ miles from London by the North Western Railway, is newly built. The church was built about 1200, and thoroughly restored in 1863. It is a neat and commodious structure, with a perpendicular tower, and contains some old monuments. A new county court was erected in 1864, and in various ways the town has been much improved of late years. The population in 1881 was 3306.

BICHAT, MARIE FRANÇOIS XAVIER, an eminent French anatomist and physiologist, was born in 1771,

at Thoirette, in the present department of the Ain. In 1793 he went to Paris in order to study surgery. Without a single introduction, it is said without even a single acquaintance in this city, he entered the school of the celebrated Desault. By his diligence and talent he became the friend of his master, who took him into his house, and with whom he lived in uninterrupted friendship until the death of Desault, which took place in the short space of two years from the commencement of their intimacy. After this event the first care of the pupil, as the best expression of his gratitude and affection, was to collect, arrange, and publish the works of his master. At the same time he opened a school for teaching anatomy, physiology, and surgery; dissected for his own lectures; carried on an extended and laborious series of experiments on living animals; gave a course of operative surgery, and devoted the greater part of the night to the duty of putting in order the papers and works of his friend and master. By these labours his health early became impaired so greatly that an accidental fall produced inflammation, which developed into typhus fever, and carried him off at the early age of thirty.

BICK'ERSTETH, REV. EDWARD, a distinguished clergyman of the Established Church of England, was born at Kirkby Lonsdale, Westmoreland, 19th March, 1816. His first occupation was that of post-office clerk in London, but after serving an apprenticeship to a London attorney he became a successful solicitor at Norwich. He was led to resign this position from the deep interest he took in religious work; and having been admitted to orders in 1845, he was sent to Africa by the Church Missionary Society. His labours there were very successful, and on his return to England he was appointed secretary to the society. In this position his zealous and able service added largely to its prosperity, and he retained his position until 1850, when he resigned it on his acceptance of the rectory of Wotton in Hertfordshire. Here he remained until his death, which took place 24th February, 1850. An earnest member of the Evangelical party he strongly opposed the endowment of the Roman Catholic College of Maynooth, and the Tractarianism or Ritualistic movement in the Church of England. His religious writings fill sixteen vols., and he also edited the "Christian Family Library," of which between forty and fifty vols. were issued.

BICYCLE (Latin, *bis*, twice; and Greek, *kuklos*, a wheel), a locomotive machine, the modern development of the velocipede, which is very popular among the athletes of the present day. It consists of two wheels, connected by a strong frame, on which is fixed the rider's saddle, motion being imparted by a crank action attached to the revolving axle of the front wheel moved by the rider's feet.

The first form of the velocipede was designed by Blanchard in 1779, but it does not appear ever to have come into use. In 1818 the "dandy horse," or velocipede, was patented in France and England by its inventor Baron von Drais. This consisted of two wooden wheels of equal size, running one behind the other—the rider sitting astride the connecting bar on a saddle; and motion was imparted by striking the ground with the feet. In 1861 a great improvement was introduced by a Frenchman, whose name is unknown, but who introduced the principle of the crank action and pedals; and in 1869 it occurred to M. Michaux, of Paris, to make the front wheel larger than the hind one. The machines were at first made of wood, but the superior strength and lightness of metal was soon apparent, and the improved machine became rapidly popular both in France and England.

Bicycles are now built of the finest iron and steel, and vary in weight from 30 to 60 lbs. There are a large number of makers in the trade, and fresh patterns are introduced every year, though the machine has already reached a high state of perfection. With careful and

-skilful riding the bicycle is attended with but little danger, and there have been very few serious accidents reported when the immense number of riders is considered. The difficulty of learning, and the constant care necessary when riding over rough or unknown roads, have, however, caused a demand for a machine which is easier and safer, although it may not be quite so rapid; and this want is met in the improved tricycles, which, as their name implies, have three wheels. For racing and along level roads the tricycle is not so fast as the bicycle, but it is even faster on uneven hilly roads. See TRICYCLE.

BIDASSOA, a river in Spain, which rises in the mountains surrounding the valley of Baztan. While flowing through the valley it bears the name of Baztanubi, and runs S.W. and W. with a gentle current between numerous neat villages situated on its banks. It afterwards changes its direction northwards, and enters the province of Guipuzcoa; then, crossing the district of Irun, it forms the boundary between Spain and France, and leaving the town of Puenterrabia on its left bank, enters the ocean near Cape Higuer. This river abounds in fish, especially salmon. In 1813 the allied army under Wellington surprised and drove the French from their strongly fortified positions on the north side of the Bidassou River.

BIDDLE, JOHN, styled the father of the English Unitarians, was born in 1615, in Wotton-under-Edge, in Gloucestershire. He was first educated in the grammar-school of his native town. In 1632, in his seventeenth year, he was admitted a student of Magdalen Hall, Oxford. Here he took his degree of Bachelor of Arts in 1638, and that of Master of Arts in 1641. He was soon after elected master of the free school in the crypt in the city of Gloucester. His theological studies meanwhile were prosecuted with great ardour; and carrying into these the same freedom of inquiry which he had shown in philosophical and academical pursuits, he printed a small tract entitled "Twelve Arguments, drawn out of the Scripture, wherein the commonly received opinion touching the deity of the Holy Spirit is clearly and fully refuted." The cry of heresy was soon raised against him. On the information of a pretended friend, he was summoned before a bench of magistrates, and committed to the county gaol, 2nd December, 1645. His release on bail was not obtained without considerable difficulty. At his examination before the magistrates he delivered a "confession of faith," which failed to satisfy them in respect to his opinions concerning a plurality of persons in the Godhead. From the ambiguity of this document, it is evident that Biddle's mind was then in a state of transition from Trinitarianism to Unitarianism, without being quite decided either way. About the same time he was summoned before the Parliament at Westminster, who appointed a committee to inquire into his case. On his refusing to make any admissions relative to the nature of Christ, he was kept in a state of uncertainty for nearly eighteen months, at the end of which time he addressed a letter to Sir Harry Vane, whose friendly interference brought the matter before the house. But the termination of these proceedings was unfavourable to Biddle, who was committed to the custody of one of the officers of the House of Commons, and deprived of his liberty for five years. In the meantime the case was referred to the assembly of divines then sitting at Westminster, before whom Biddle often appeared. In the year 1648, while yet in prison, he printed a "Confession of Faith concerning the Holy Trinity according to the Scriptures, with the Testimonies of several of the Fathers on this head." This was followed by another tract entitled "The Testimonies of Irenæus, Justin Martyr, Novatianus, Theophilus (who lived the two first centuries after Christ was born, or thereabouts), as also Arnobius, Lactantius, Eusebius, Hilary, and Brightman, concerning that one God and the persons of Holy Trinity." His confinement

continued with unabated strictness, till, after the execution of King Charles, the influence of the Independents gained ground, and with it, under the auspices of Cromwell and Fairfax, a relaxation of the penal laws relating to religion. Favoured by these changes Biddle was released from prison under certain conditions, and retired into Staffordshire. His retirement was disturbed by Bradshaw, president of the council, who, being informed of it, remanded him to prison.

In 1651 an act of indemnity and oblivion was passed by Parliament, which included all heretical offences. To this measure Biddle was indebted for his liberty, after a confinement, with a short intermission, of about six years. The first use that he made of his freedom was to collect around him those friends and adherents whom his writings had brought over to his opinions. They gradually formed themselves into a society. The members of this society were called Bidelians, and from their agreement in opinion concerning the unity of God and the humanity of Christ with the followers of Socinus, they were sometimes denominated Socinians. The name which properly characterizes their fundamental opinion is that of Unitarians. This was, indeed, the rise of the English Unitarians. The publication of the "Scripture Catechisms" brought the vengeance of government again upon their author. He was committed to close confinement in the Gate-House. On the dissolution of the Long Parliament Biddle again obtained his liberty, but his book was publicly burned. In July, 1655, his adversaries lodged an information against him, and obtained his committal to the Compter, from which prison he was removed to Newgate, and tried for his life on the ordinance against blasphemy and heresy. He was then banished to Star Castle, in St. Mary's, one of the Scilly Isles, with an annual subsistence of 100 crowns. In this state of exile he continued for three years, when the solicitation of his friends and change of circumstances induced the Protector to grant a writ of *habeas corpus*, under which he returned. He then became the pastor of an Independent congregation in London, where he remained till the restoration of Charles II. Biddle tried to evade the threatening storm which fell upon all who dissented from the Episcopalian mode of worship, now re-established, by retiring from public duty, but his caution was unavailing. On 1st June, 1662, he and his friends were apprehended and taken to prison; they were fined in £20 each, and he in £100. Not being able to pay this penalty, he was remanded to prison, where in less than five weeks he contracted a disease which terminated his life, 22nd September, 1662, in the forty-seventh year of his age. He was a man of pure and irreproachable life.

BIDEFORD, a municipal borough and market-town of Devonshire, stands on the Torridge, 9 miles S.W. from Barnstaple, and 220 from London by the South-western Railway. The town is beautifully situated on an acclivity on the W. of the river, and is very clean and healthy. It consists principally of two wide and well-paved streets, with well-built houses. The church, having become unsafe, was taken down and rebuilt in 1864, with the exception of the tower, which was only restored. There are also five places of worship for Dissenters, two of them being new and handsome buildings. The free grammar-school is of ancient foundation, and liberally endowed. There are numerous other schools, besides various charitable endowments. A handsome bridge of twenty-four arches and 740 feet in length, built in the early part of the fourteenth century, crosses the Torridge. It was strengthened and widened in 1864 at a cost of £4000, and is one of the favourite promenades of the inhabitants. There are manufactures of ropes, sails, and earthenware, &c., and shipbuilding is carried on. At full tide the spacious quay near the centre of the town is accessible to vessels of 500 tons; and about 2½ miles above the bridge the Torrington Canal joins the river. The trade of

Bideford was formerly very extensive; its imports of Spanish wool and Virginia tobacco being exceeded only by those of London in the early part of last century. Its importance as a commercial town has greatly declined, and the trade is now chiefly coastwise. The principal imports are timber and coals, and the exports oak-bark, oats, malt, sails, cordage, &c. The number of vessels registered as belonging to the port in 1883 was 80 (5400 tons). Both Bideford and Appledore, which joins it, are resorted to as summer watering-places. Population in 1881, 6512.

BIDPAL. See **L'ILFAY**.

BIEL. See **BIENNE**.

BIELFELD, a subdivision of the circle of Minden, in the north-eastern part of Westphalia. It is intersected by a triple chain of hills, of which chalk, sand, clay, and marl are the constituent parts. It is watered by the Lutter and Au, and their tributaries. The manufacture and bleaching of linen is carried on extensively; large quantities of grain, flax, and hemp are grown, and great numbers of horned cattle are reared. Iron-ware, tobacco, woollens, leather, soap, copper and copper-ware, yarns and damask cloths, are manufactured.

BIELEFELD, the capital, stands at the foot of the Sparenberg Mountain, on the Lutterbach, about 40 miles S.W. of Minden, on the railway between Düsseldorf and Hanover; population, 30,679. It possesses four churches, a gymnasium, an orphan asylum and infirmary; its principal manufactures are linen, linen and cotton yarn, ribbons, soap, tobacco, iron and steel, meerschaum pipes, &c., and there are also some very extensive bleaching-grounds near the town.

BIELGOROD. See **BIELGOROD**.

BIEL'LA, a town of Northern Italy, situated on the slope and foot of a hill, 36 miles N.N.E. of Turin, gives title to a bishop, has a cathedral and several churches, a college, woollen and silk manufactures, and 10,500 inhabitants. There is a good trade in wine, silk, oil, and chestnuts.

BIEN'NE or **BIEL**, a town in the canton of Bern, stands on the Suze, at the foot of the Jura Mountains, and near the Lake of Biemme. It has 11,613 inhabitants, who manufacture watches, cotton, and leather. The town is surrounded by walls defended by towers, and is connected by railway with all the leading towns of Switzerland. It is about 17 miles N.W. of Bern. The lake is about 10 miles long, $2\frac{1}{2}$ miles in its greatest breadth, and 217 feet in its greatest depth. Its surface is 1330 feet above the sea. The small island of St. Pierre, in which Rousseau resided in 1763, is in the middle of the lake.

BIGA, a chariot or car drawn by two horses. The Romans had also their quadrigæ, and sometimes their sejuges, septim-juges, &c.; and Suetonius says that Nero, when he was a performer in the Olympic games, made use of a decem-jugis, a chariot drawn by ten horses (Suet. "Nero," c. 21). The famous marble statue of the biga in the Vatican is one of the great treasures of ancient art.

BIG'AMY, in the canon law, signified either a second marriage with a virgin after the death of the first wife, or a marriage with a widow. It incapacitated men for holy orders; and until the 1 Edw. VI. c. 12, s. 16, it was a good counterplea to the claim of benefit of clergy (Wooddesson's "Vinerian Lectures," i. 425). The word *bigamy* (from the Low Latin *bigamnia*), which signifies "a second marriage," is an irregular compound, formed of the Latin word *bi*, "double," and the Greek *gamos*, "marriage." The word, if consistently derived from the Greek, would be *digamy*.

Bigamy, by the English law, consists in contracting a second marriage during the life of a former husband or wife, and the statute 1 James I. c. 11, enacted that the person so offending shall suffer death, as in cases of felony (Hale's "Pleas of the Crown," i. 692, fol. ed. 1736). This statute was repealed by 9 George IV. c. 31, s. 22, for England, and 10 Geo. IV. c. 84, s. 26, for Ireland; and

these have been repealed by 24 & 25 Vict. c. 100. The statute last cited enacts, "That if any person being married shall marry any other person during the life of the former husband or wife, whether the second marriage shall have taken place in England, Ireland, or elsewhere, such offender and any person aiding him shall be guilty of felony, and be punished by transportation for seven years, or by imprisonment (with or without hard labour) for a term not exceeding two years." The statute excepts, first, any second marriage contracted out of England or Ireland by any other than a subject of her Majesty; second, any person whose husband or wife shall have been continually absent during seven years, and shall not have been known by such person to have been living within that time; third, a person divorced from the bond of the first marriage; fourth, one whose former marriage shall have been declared void by the sentence of any court of competent jurisdiction.

The fourth exception cannot be taken advantage of if the first marriage has been declared void only collaterally and not directly; or if, admitting it to be conclusive, it can be shown to have been obtained fraudulently or collusively.

The offence of bigamy consists in going through the form of a second marriage while the first subsists, for the second marriage is only a marriage in form, because a man cannot have two wives or a woman two husbands at once. The main ground for punishing a person who contracts such second marriage is, or ought to be, the injury that is thereby done to the party who is deceived.

BIG'ARADE or **BITTER ORANGE** is the *Citrus aurantium*, var. *Bigaradia*, of Hooker. The fruit is uneven, more or less globose, deep yellow, with an acid and bitter pulp. Numerous varieties of it are known, among which are all those cultivated for the sake of their flowers, especially the Horned Bigarade, a variegated variety of it, and the Curled-leaved Bigarade. The following are a few of the most striking forms of this species:—1. The Horned Bigarade is much esteemed on account of the strong and delicious perfume of its flowers. 2. The Female Bigarade, with a deep yellow, large, coarse fruit, containing orange within orange. 3. The Curled-leaved Bigarade. No variety is more generally cultivated than this for the sake of its flowers, which are large, sweet, and produced in extraordinary profusion. 4. The Purple Bigarade. 5. The Double-flowered Bigarade, the common Double Orange of the nurseries. It is a great favourite in gardens, because of its multitudes of fragrant double flowers, which do not fall in pieces so quickly as those which are single. 6. The Seville Bigarade, or Seville Orange, with round dark fruit, having an uneven, rugged, extremely bitter rind. It is brought in great quantities to the English market, where it is consumed in the manufacture of bitter tinctures and in the preparation of candied orange-peel. The bitter aromatic principle is a powerful tonic; it gives its flavour to the liqueur called Curaçon. 7. The Bizarre Bigarade, with fruit of different sorts, some being round and of the common appearance, others half bigarades and half lemons or citrons, the pulp of some being sweet, that of others acid and bitter. Sir J. Hooker considers the bigarade to be a variety of the wild orange, which he has seen growing spontaneously south of the Himalayas, from Sikkim to Khasia. Pictet has shown that the Sanskrit fruit *naga-ranga* was the bigarade and not the orange. The Arabs introduced it into Arabia at the end of the ninth century, and probably also into Sicily and Spain. See **CURRUS**.

BIG'GLESWADE is a town in the county of Bedfordshire, 9 miles E.S.E. from Bedford and 41 from London by the Great Northern Railway. It is situated near the river Ivel, over which there is a stone bridge. The river is navigable to the town, which is thus supplied with coals, timber, &c. There is a large corn market on Wednesdays. The houses are chiefly brick, and have a neat and modern appearance. Thread-lace is manufactured on a small scale,

and straw-plaiting is also carried on. The entire area of the parish is 4220 acres, much of which is laid out in gardens for the supply of the London markets. The parish church is an ancient Gothic building, which was thoroughly repaired and re-arranged in 1832. There is a town-hall and county court-house, and a cemetery was opened in 1868. The population of the parish in 1881 was 4917, inclusive of the hamlet of Holme and Stratton.

BIGNONIA, a genus of plants named by Tournefort after the Abbé Bignon, librarian to Louis XIV.

All the species of this genus are splendid plants while in blossom, and deserve a place in every collection. Most of them are climbers, and adapted for training up rafters and pillars (e.g. *Bignonia capreolata*), but they only grow freely in stoves. A mixture of loam and peat is best adapted for their growth, and cuttings will strike readily under a hand-glass in heat, either in mould or sand. The characteristics of *Bignonia* are a bell-shaped calyx; a corolla somewhat two-lipped, with a long wide tube; anthers without hairs; a disc; a two-celled ovary; a long narrow pod-like capsule, divided into two by a partition parallel with its sides (or valves), which are flat and undivided; seeds arranged in single series along the margins of the partition. See CHIRCA.

BIGNONIA CEEA is an order of plants belonging to the MONOPETALÆ, with irregular flowers, stamens didynamous or only two, ovary commonly divided into two cells by the union of the two placentas, a pod-like fruit, winged seeds without albumen, and usually a climbing habit. They are mostly shrubs, inhabiting the hotter parts of Asia, Africa, and America, and unknown in Europe except in a cultivated state. Some of them are trees of considerable size. The most interesting genera are *Bignonia*, *Tecoma*, *Catalpa*, *Eccremocarpus*, *Jacaranda*, *Spathodea*, and *Crescentia*.

BIGORRE, a county in the former province of Gascogne in France. It now forms almost the whole of the département of Hautes-Pyrénées. [See PYRÉNÆES.] Bagnères-de-Bigorre, Barges, Cauterets, Tarbes, and Vic-en-Bigorre were the chief towns.

BIJNAUR (*Bijnor*), a district in the Lieutenant-governorship of the North-western Provinces of British India. The area is 1902 square miles, and the population 750,000. Bijnor is the northernmost district of the Rohilkhand Division, and is bounded on the N. and W. by the Ganges, on the S. by Moradabad, and on the E. by the Tarai and British Garhwal. The administrative headquarters are at the town of Bijnaur.

The character of the soil and the system of tillage in Bijnaur do not materially differ from those prevalent throughout the whole upper basin of the Ganges and its tributaries. Here and there, especially in the south-western corner of the district, undulating sandhills overlie the fertile soil, composed of materials which originally shifted from time to time before the prevailing westerly winds, but which have now become fixed in position and bound together by coarse vegetation. Most of them produce barley and other crops in years of favourable rain. The open plain country is divided into *bangar* or upland, and *khadir* or lowland. The latter lies along the river sides, and its soil is always composed of clay, but intermixed with sufficient sand for agricultural purposes. Of the cultivated area 36 per cent. is *khadir*, and 64 per cent. *bangar*. Besides the alluvial border of the Ganges, the rivers Malin, Kho, and Raunganga are all fringed with a fertile strip of valuable lowland. Wheat, rice, cotton, and sugar-cane form the most important products. The mode of cultivation is simple, and the implements in use hardly differ from those of the Vaidik age.

Bijnaur suffers, like the other north-western districts, from drought, and its natural consequence famine. Indeed as its dense population depends largely for support upon

imported grain, even during the most favourable years, it would be very disastrously affected by dry seasons, were it not for the unusual moisture of the soil, due to its sub-montane position.

Sugar is the great commercial staple of the district, the Bijnaur manufacture fetching higher prices in the market than any other Indian brand. The chief manufactures are Brahmanical threads (*jamra*) from Bijnaur; papier-maché from Mandawar; metal-work, blankets, cotton, and shoes from Najabad; and carved ebony, glass-ware, ropes, and fire-arms from Nagina. Traffic meets with a serious impediment on its way to the markets of the Doab, from the interposition of the Ganges with its heavy sand, and almost impassable alluvial fringe.

The chief endemic diseases of Bijnaur comprise intermittent fevers, dysentery, and bowel complaints. Ophthalmia also causes much trouble, and small-pox not unfrequently occurs. The climate on the whole may, however, be considered pleasant and healthy.

BIKANER (*Bikaner*), a state in Rajputana, under the political superintendence of the Rajputana Agency and the government of India, lying between 27° 32' and 29° 57' N. lat., and 72° 30' and 75° 50' E. lon. The area is estimated at from 18,000 to 23,000 square miles. From the city of Bikaner south-west to the Jaisalmer border the country is hard and stony; but throughout the greater part of the territory the plain is undulating or interspersed with shifting sandhills, whose slopes, lightly furrowed from the action of the wind, suggest the ribbed appearance of the sea-shore. Generally speaking the villages are far apart, and though grass and jungle bushes abound, the aspect of the country is dreary and desolate in the extreme.

The Bikaner country contains no rivers or streams. In the rainy season a *nala* sometimes flows from Shaikhawati over the eastern border, but is soon lost in the sands.

Bikaner suffers from extremes of heat and cold. During the hot season the heat is exceedingly great; heavy sand-storms are of frequent occurrence, and the sun is so powerful that even the natives of the country fear to travel in the middle of the day. In winter the cold is generally very severe, trees and vegetation being injured by the frost.

The staple crops are *bajra* (*Holcus spicatus*) and *makh* (*Phaseolus acutifolius*); water-melon and *kukris* (a coarse kind of melon) are also grown. Bikaner abounds in the best cattle grasses; indeed the whole country may be said to be a pasture ground. The domestic animals are finer and more serviceable than those of any other part of India; the horses are strong and wiry; the cattle and buffaloes are equally famous. The state was formerly renowned for its riding camels, but they have deteriorated. The principal manufactures are blankets and sweetmeats; the exports, in addition to these, are wool, soda, fuller's earth, grain, leather, water bags, and ivory bracelets ornamented with gold, which are in great demand throughout Rajputana. The total population of the state is about 300,000.

BIKANER, the capital of the above state, is situated on a slight elevation amid a scene of singular dreariness, the soil being stony and totally unfit for cultivation.

Viewed from some points it presents the appearance of a great city, having a fine wall surmounted by round towers and crowned with battlements. In the interior are many good houses, faced with red sandstone richly carved; but the houses are situated in narrow dirty lanes, where they can scarcely be seen. None of the capitals or large provincial towns of Rajputana can vie with Bikaner as regards the grotesque irregularity of its thoroughfares. The population of the city and its suburbs is estimated at 35,000.

BILASPUR, a district in the Chief-commissionership of the Central Provinces, British India, lying between 21° 22' and 22° 32' N. lat., and between 81° 3' and 83° 5' E. lon. The area is 7798 square miles, and the population 720,000.

The district resembles a vast amphitheatre, opening on

the south upon the plains of Raipur, but on every other side surrounded by tiers of hills. These irregular chains, though known in each locality by a special name, form in truth a part of the great Vindhyan sandstone range, which extends from east to west across the whole peninsula of India.

The Mahanadi, though it only flows for about 25 miles along the south-eastern extremity of the district, forms the centre of the drainage system of Bilaspur. A magnificent river during the rains, attaining in places a breadth of 2 miles, in the hot season it dwindles down to a narrow stream, creeping through a vast expanse of sand, which may almost anywhere be forded with ease.

A cloth of scanty dimensions forms the sole dress of a cultivator, and a cloth of larger size satisfies all the requirements of fashion for the women. It is tightened at the waist, and while half hangs loosely down to the knee, the other half is spread over the breast, and drawn across the right shoulder. For ornaments a man will adopt a gold or silver bracelet or small earrings, or girdle himself on a silver waistband; few, except young gond ladies, wear toe rings or anklets.

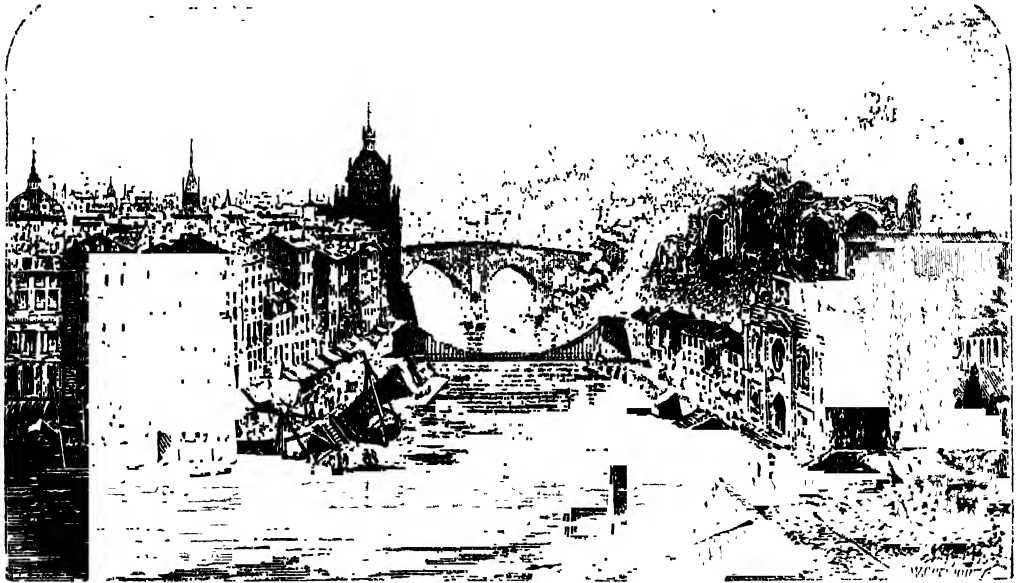
Rice forms the staple crop of the district. Sugar-cane and garden produce grow well on the sandy patches. It is only for these crops that irrigation is resorted to and

mannre used. The extensive forests of the districts are situated in the chiefships, and belong to private proprietors.

The weaving trade constitutes the only important local industry. The district offers at many points sandstone excellently suited for building purposes, but the only important quarries are those near Bilaspur and Seorinarayan.

From the middle of April to the middle of June hot winds prevail, and the heat is frequently excessive; though tempered by occasional showers after the first heavy fall of rain the climate becomes cool and agreeable, and few days pass without a pleasant breeze. Fever proves by far the most fatal disease in the district.

BILASPUK, the chief town and administrative headquarters of the above district, is situated on the south bank of the river Arpa. In the last century Kesava Panth Subah, who administered the district under the Marhattas, fixed his residence here and began to build a brick fort on the river-bank. Subsequently on the Marhattas removing their headquarters to Ratanpur, the rising prosperity of the town dwindled away. In 1862, however, Bilaspur was constituted the headquarters of the British district. The belt of woods, the gardens and mango groves, and the distant hills, render the situation pleasant and attractive. The population is 5000.



Bilbao.

BILBAO, a city in Spain, the capital of the senoria of Biscay, is situated in a spacious and fertile plain on the right bank of the Nervion, 9 miles E.S.E. of Portugalete, in 43° 15' N. lat., 2° 56' W. lon., and has a population of 18,000. The town is well and substantially built, the houses are generally three stories high, and the streets are well paved. The water of the river is conducted through pipes to the most elevated part of the different streets, from which it flows through them in abundance, and contributes much to the health and cleanliness of the town. There is a large hospital fitted up with numerous beds, an orphan asylum, a theatre, and a slaughter-house, where the meat is also sold, which is a fine building of the Tuscan order, situated in the middle of the town. The inhabitants are employed in agriculture, commerce, and the manufacturing of iron. There are also manufactures of paper, hats, soap, leather, earthenware, and cigars. The

principal articles of exportation are wheat and iron ore to foreign countries, and iron to other parts of the Peninsula. Very large quantities of iron ore are sent to England. On the right bank of the river there is a wide and pleasant promenade, planted with lime-trees and oaks. The river is crossed by four bridges, and numerous wharfs and strong moles are built on both banks. There are large docks for building merchant vessels. The tide ascends as high as the town, but only small vessels under 60 tons can sail so far up the river, except with a very full tide; the greatest part of them remain at Olavenga, 2 miles below the town. Bilbao is the seat of the government of the province and of a tribunal of commerce. An English cemetery was opened near the town in 1868. The trade largely increased after the opening of the railway to Tudela in 1864, and Bilbao absorbed a larger portion of foreign trade than any other port in Spain except Barcelona. This

prosperity was interrupted by the Carlist civil war, one of the chief events of which was the siege and relief of Bilbao in 1874. The town and district laboured under great disadvantages until the close of the Carlist struggle in 1876, but since that time several branch railways have been constructed, which have assisted in developing the resources of the district.

BILBERRY, a berry-bearing shrub (*Vaccinium myrtillus*), is abundant in the British Isles, especially in the north, and in hilly districts of the south. It flowers in May, and its berries are ripe in the autumn. In the north of England and Scotland the berries are gathered and used for making tarts; in Devonshire they are eaten with clotted cream. It is distinguished from other species by its leaves being deciduous, ovate, serrate; anthers with two horns; and black berries. See **VACCINIUM**.

BILBOES are fetters consisting of long bars of iron, fitted with sliding shackles, for confining the ankles. They are principally used on shipboard as a means of punishing refractory sailors. The name is derived from Bilbao, where they were first invented. Some of the bilboes that were taken from the Spanish Armada are still preserved in the Tower of London.

BILE, an animal fluid of a reddish-yellow or occasionally a greenish colour, bitter taste, and viscid consistence. It is sometimes found as a limpid and at other times as a turbid fluid. The composition of human bile may be said to be rather over four parts of water to one of solids; and of the solid constituents two-thirds are of the substance called *bilin*, and the greater part of the remainder is coloured *mucus*, to which fat, cholesterine, and certain salts are added. Bilin, when freed by ether from the fat with which it is combined, is a resinoid substance, soluble in water and alcohol, and giving to a watery solution the characteristic taste and properties of bile. It is composed of soda combined with *glycocholic* and *taurocholic* acids. These two acids are compounds of *cholic acid* with *glycin* (otherwise called amido-acetic acid) and with *taurin* (otherwise called amido-isethionic acid) respectively. The yellow colouring matter of bile is called *billi-rubin*, the green variety *billi-verdin*; and both have great affinity to the colouring matter of the blood and of the urine.

The fluid which has this compound character is found in the large gland called the liver, and is separated by this organ from the blood which has already circulated in the system. The means by which this is done is the arrangement of the venous system of the abdomen. The veins here, instead of passing at once to the heart after receiving their blood from the capillaries, pass to the liver, and this organ forms the bile from the unoxygenated blood they contain. [See **LIVER**.] The secretion of bile in the liver is continual, but is accelerated during digestion. When formed it is collected from the cells in the hepatic duct, and during digestion is poured into the intestine at once. In times of fasting it collects in the gall-bladder ready for use so soon as digestion recommences, for the orifice into the intestine is so small that, unless the bile flows with the force given it under the stimulus of digestion, very little, if any, passes from the duct; nearly the whole secretion falls back from the resisting orifice into the gall-bladder ready to receive it. If a permanent obstruction be offered the bile is absorbed into the blood, and the well-known phenomena of jaundice ensue. About 35 oz. of bile are secreted by a healthy man in twenty-four hours.

One function of the liver is the throwing off heterogeneous or crude materials from the blood in the form of the bile, this fluid at the same time exercising an important office in the function of digestion. The bile is formed of constituents which if they remained in the blood would undoubtedly be injurious to the body, and are therefore got rid of by the intestines. The use of the bile in digestion seems to be principally the emulsification of the fats,

so that the lacteals can absorb that portion of the food. It is proved by experiments that if bile is checked, healthy chyle cannot be formed: instead of a milky fluid, clear liquid fills the lacteals. Also it is now known that, like the "gastric juice," bile has great antiseptic powers. A third function known in bile is the stimulation it exerts on the glands of the intestines, producing increased secretion, and at the same time increased peristaltic action—hence possibly the obstinate constipation which is so distressing a concomitant of jaundice.

The bile still presents great difficulties to the physiologist; for while there is reason to believe that much of the bile is reabsorbed during its passage along the intestines, at the same time it is not discoverable in the blood. Probably it becomes broken up into its chemical elements before absorption. Its chemical constituents are carbon, hydrogen, oxygen, and nitrogen: to which are added sulphur in combination with soda.

BILGE, that part of a ship's bottom nearest the keel. The word is the same as *bulge*, and is akin to the Gaelic *balg*, our *belly*, *bellows*, or *bag*; all of these mean a protuberant hollow form in different varieties. In older English writers the "belly of the ship" is often spoken of. When aground a ship usually rests on her keel and one bilge. Bilge water is that which is found at the lowest part of a ship, and is usually very foul.

BILIN, a small town in Bohemia, of about 3000 inhabitants, lying on the river Bila, and distant about 3 miles from the baths of Teplitz. The environs are remarkable for a precipitous mountain, called the Bilinestein, which is surrounded by basalt rocks; but the place itself is most celebrated for its acidulous and bitter springs.

BILL, in Parliament. See **PARLIAMENT**.

BILL CHAMBER, a department of the Court of Session in Scotland, in which one of the judges officiates at all times, during session and vacation. The youngest judge is lord ordinary on the bills during session; the duty is performed by the other judges, with the exception of the two presidents, by weekly rotation during vacation. All proceedings for summary remedies, or for protection against impending proceedings, commence in the bill chamber—such as interdicts (*Anglice*, injunctions), suspensions of execution against the property or person, &c. The process of sequestration or bankruptcy issues from this department of the court. The greater number of the proceedings are sanctioned by the judge as a matter of form, on the clerks finding that the papers presented ask the usual powers in the usual manner; but if a question of law is involved in the application, it comes into the Court of Session, and is discussed as an ordinary action. The lord ordinary on the bills is the representative of the court during vacation.

BILL OF ADVENTURE is a writing given by a merchant stating that the goods shipped by him, and in his name, belong to some one else, who has the responsibility of the adventure, or speculation, and to whom he undertakes to account for the results. Not a *nomen juris* in Scotland.

BILL OF ATTAINDER. See **ATTAINDER**.

BILL OF COSTS is the name given to the account showing in detail the disbursements made by a solicitor or attorney on behalf of his client, with his charges for services rendered. Any person who has employed an attorney may have his bill of costs submitted to one of the masters of the respective courts for taxation. Each item of the bill is then examined, and such charges as are deemed excessive or unreasonable by the master are reduced or struck out—those that are legal being certified, and called the master's allocation. If on such taxation more than one-sixth be disallowed, the attorney has to pay the costs of taxation. A bill of costs may, by order of a court, be taxed after it has been paid. In Scotland a bill of costs is termed an "account of expenses," and in the Supreme

Court is taxed by the auditor of that court—in the local courts by their respective auditors.

Under ordinary circumstances an attorney or solicitor cannot bring an action to recover his bill of costs before a calendar month after it has been delivered to his client, but should he have good cause for believing that the latter is about to evade payment by leaving the country or becoming a bankrupt, he may obtain leave from a judge to sue in less time for the amount. No rule of this kind has been established in Scotland.

BILL OF EXCEPTION. This name was formerly given to a statement of objections by way of appeal in a civil case against the ruling or charge of a judge who was obliged, at the request of counsel, to publicly seal such a bill, stating the point on which he was supposed to err. These bills are now abolished, and all appeals to the Court of Appeal must be by way of rehearing brought on by notice of motion in an ordinary way—no petition case or other formal proceeding being necessary. Procedure by bill of exception is still competent in Scotland.

BILL OF EXCHANGE is by the Bills of Exchange Act, 1882 (45 & 46 Vict. c. 61, s. 3), defined as “an unconditional order in writing, addressed by one person to another, signed by the person giving it, requiring the person to whom it is addressed to pay on demand, or at a fixed or determinable future time, a sum certain in money to, or to the order of, a specified person, or to bearer.” The person who gives the direction is called the drawer of the bill, he to whom it is addressed the drawee, and he in whose favour it is given the payee, sometimes the remitter. When the drawee signs the bill in token of his agreeing to its request, he is termed the acceptor. The acceptance must be written on the bill, and signed by the drawee, but the mere signature of the drawee is enough without additional words.

Bills of exchange are usually divided into two classes—inland and foreign. Inland bills are those which are both drawn and payable within the British Islands, and this expression is defined to mean any part of the United Kingdom and the adjacent islands, such as Man, Guernsey, &c. Any other bill is a foreign bill. But unless the contrary appear on the face of the bill, the holder may treat it as an inland bill (see Sec. 4 of the above-cited Act). Hence a bill drawn in Scotland or Ireland upon a party in England, or conversely, is an inland bill; and a bill drawn in France on a party in England, or vice versa, is a foreign bill. Even in the latter case, if the bill does not *ex facie* bear to be drawn or accepted abroad, it may be treated by the holder as an inland bill.

Promissory notes may be classed as a species of bills, and are thus defined:—“A promissory note is an unconditioned promise in writing made by one person to another, signed by the maker, engaging to pay on demand, or at a fixed and determinable future time, a sum certain in money to, or to the order of, a specified person, or bearer.” As in the case of bills, “a note which is, on the face of it purports to be, both made and payable within the British Islands, is an inland note. Any other note is a foreign note” (see Sec. 3). The legal incidents of bills and notes are much the same—the maker of a note answers to the acceptor of a bill; when a note is indorsed the indorser becomes, as it were, the drawer, and the indorsee the payee. Bills are payable on demand when they bear to be so, or at sight, or on presentation, or on which no time of payment is expressed. When a bill is not payable on demand, *three days of grace* are, unless otherwise provided, added to the time of payment fixed by the bill.

Bills enjoy the privilege of being transferred without formal assignment. This is termed *negotiation*. A bill payable to bearer is negotiated by delivery; one payable to order is negotiated by indorsement of the holder completed by delivery. To a valid indorsement the simple signature

of the indorser on the bill is sufficient. An indorsement in blank specifies no indorsee, and a bill so indorsed is payable to bearer. A special indorsement specifies the person to whom, or to whose order, the bill is payable. A blank may be converted into a special indorsement by the holder. A person signing a bill otherwise than as drawer or acceptor is liable to the holder as an indorser. In short, it may be said, generally, that any person whose name appears on a bill incurs serious liabilities to the holder, and so every additional name on a bill adds to its credit as a negotiable instrument.

A bill or note is void unless duly stamped in terms of the Stamp Acts, and the stamp cannot be supplied or altered if not at first correct. The signing of a bill blank in the amount is an authority to the holder by which he may fill in any sum he chooses up to the amount the stamp will carry.

To fix liability against parties to a bill in favour of the holder presentment for acceptance and for payment is usually required, and for some purposes noting and protest are necessary. But the rules applicable to such matters are somewhat complicated, and can only be understood by reference to the Act of 1882.

Payment of bills and notes may be enforced in the same way as other obligations; but in addition, the Act 18 & 19 Vict. c. 67 gave a summary process to the plaintiff in an action commenced within six months after the bill or note had become payable. In such case the plaintiff could at once sign judgment for the amount and costs, unless the defendant had obtained leave to appear and defend, and if he could only obtain on paying the amount into court or satisfying the judge by affidavit that he had substantial grounds for defence. In Scotland the creditor in a bill or note had long enjoyed similar privileges. This Act has never been repealed, but its provisions have been materially affected by the application of the Judicature Act of 1875. By the rules of court under the latter Act the right of proceeding by means of summary process was annulled, and it was provided that no writ should be thereafter issued under the Summary Procedure or Bills of Exchange Act. At present, therefore, the holder of a dishonoured bill of exchange or promissory note can only recover judgment by writ of summons in the ordinary course as for money due and owing.

Possessed as bills thus are of simple form, easy transference, and speedy execution, they not only afford a ready means to merchants and manufacturers to turn their credit into a negotiable shape, and to carry on their dealings as for ready money, while affording their customers reasonable credit, but they are extensively employed among all classes of the community in the ordinary transactions of life. They may thus be viewed as forming no small part of the circulating medium of the country.

The facilities which bills afford for raising money on credit are often of use to the legitimate trader, but too often are perverted to lead the speculative, the unwary, or the confiding to ruin. If two or more persons combine, they may easily raise money by their joint or several credit on what is known as “accommodation” or wind bills, and this practice is so common as to have led to statutory enactments. Upon this subject the act above cited provides as follows:—“An accommodation party to a bill is a person who has signed a bill as drawer, acceptor, or indorser, without receiving value therefor, and for the purpose of lending his name to some other person. An accommodation party is liable on the bill to a holder for value; and it is immaterial whether, when such holder took the bill, he knew such party to be an accommodation party or not” (Sec. 28).

Foreign bills of exchange are employed as remittances between different countries, and for adjusting the commercial debts which may be mutually due and owing by other

parties besides those whose names may appear on the bills as drawers and acceptors. Bills are purchased by those who have to make remittances to places on which they are drawn, of parties by whom they are drawn; and the trade of purchasing and selling bills forms an important branch of monetary business, conducted by persons who are termed bill brokers. The value of the bills when offered for sale depends not only on the actual amount for which they are drawn, but also on the condition of the market as regards the demand and supply. If there are plenty of bills offered on any particular city the price falls, and when they are scarce it rises. The fluctuations in price are made regularly public in London by what is termed the "Course of Exchange," being a list of the chief cities on which bills are drawn, and it shows the rate of exchange, or the premium, or discount, on bills on the places specified.

The manner in which exchange operations are conducted may be shortly described as follows:—A foreign merchant being indebted for goods to an English firm, sends them his acceptance of their bill of exchange on him in payment. If it is made payable in this country, he must, on its becoming due, provide funds here to meet it. This he may do by sending over a sufficient amount of gold and silver; or by remitting a bill for the same sum payable in England. In the former case he must pay the expense of transmitting the gold; in the latter he must pay the premium asked by the exchange-broker in his city for such a bill as he requires. If the bills drawn on England, in the broker's hands, are numerous and the demand for them small, the premium will be low; or they may even be at a discount, in which case the broker will give the merchant a stated sum to take the bill from him. It will be seen from this description that the premium or discount depends entirely on the demand for the bills; and this is regulated by the trade between the two countries. If the foreign merchant has been importing goods from England largely, and sending there less valuable produce in return, the exchange will be against him; if, on the contrary, he has been sending more to England than the amount of the goods he has received from it, the exchange will be against England. When the exchange is against any place, the bills on it are plentiful, and the bills from it scarce. Hence gold becomes a cheaper mode of remittance to pay foreign debts than purchasing bills at high premium; and the natural law which regulates the flow of bullion between different commercial cities is therefore simply this—that, when the premium on bills is greater than the cost of transmitting gold, gold is transmitted, and *vice versa* when the premium on bills is less than the cost of remitting gold.

Inland bills of exchange are in frequent use for the purpose of remittance from one part of the United Kingdom to another. Thus the trader in Manchester, Leeds, or Birmingham, who has a payment to make in London, remits bills of his customers in the country. These are discounted by the moneyed capitalists through the intervention of bill-brokers. A few of the London bankers also discount for the accommodation of their customers, and the Bank of England deals extensively in that department. The bills so cashed are transmitted to the provincial banks to be presented at maturity for payment. In the provincial towns the country bankers discount bills on London, and transmit them to their correspondents there for payment. The rate of discount varies according to the demand for money and the character of the particular bills.

Bills of exchange are also much used as follows:—A tradesman may not be able to pay ready money, but he can give the seller an order for payment on some other person, receiving or paying the difference, as the case may be, and making an allowance by way of interest, or, which is the same thing in other words, paying an extra price, in proportion to the time of the bill's currency. To the seller this mode of dealing is better than the giving of a naked

credit, as he gets an additional chance of payment, and a written acknowledgment of his debt. When the negotiability of inland bills was admitted, they served all the purposes of actual money, because, in the same manner as the original seller had taken the order in payment, another would receive it from him in the purchase of other commodities; or it might be at once discounted or converted into cash by application to a money-dealer.*

The drawing of a bill supposes that the drawee either has in his possession funds of the drawer, or is his debtor to the amount specified in the order; it was therefore an easy step in the transactions of wholesale dealing for the seller to draw upon the buyer, for the price of the goods, a bill payable to his (the seller's) own order at some future day. This bill the buyer immediately accepted, and thus in effect acknowledged himself to be the debtor of the drawer to the amount specified, and engaged to pay the holder at maturity. By this arrangement the buyer obtains credit for the term at the expiration of which the bill is made payable, and the seller has the advantage of a fixed day for payment being named in the bill, and a means of procuring cash if he chooses to negotiate the bill.

Bills of exchange are also frequently drawn and accepted under such circumstances as follows:—There are, in most of the principal trading ports of the world, merchants who carry on the business of general factors or agents for sale, and whose establishments are known among mercantile men under the name of commission-houses. The course of dealing with such houses is, for the most part, this:—A, a manufacturer at Manchester, consigns a cargo of cotton pieces to B & Co., a commission-house at Calcutta, for sale on his account. The English correspondents of B & Co. are Messrs. C & Co. of London. By an arrangement among these several parties A draws on C & Co. for half or two-thirds, as may be agreed, of the invoice price of the goods consigned, and by discounting the bill with his banker obtains at once an instalment in money, which immediately returns into his capital, and becomes useful in producing more goods. Ultimately account sales are furnished by the Calcutta house, and A again draws on C & Co. for the balance in his favour. Annual balances are struck between B & Co. and C & Co., and remittances by bills for the adjustment of the account complete the transaction. Now the advantages of this anticipatory part-payment are obvious, more especially in the trade with distant countries.

Good bills may be always discounted. Accordingly, any man whose credit is good may at any time raise money upon a bill drawn, accepted, or indorsed by himself. If his credit be doubtful, he may still procure cash by the same expedient, but he will have to pay a premium or rate of discount proportioned to the increased risk. Among needy men instances are not unfrequent of discounts procured by these means at the exorbitant rate of 20, 30, 40 per cent., and upwards. But a still more common practice is the negotiation of what are called *accommodation bills*. A trader, unable to meet his liabilities, applies to a friend whose credit is better than his own to accept, or in some other way to become a party to a bill made for the purpose; the trader undertakes to provide the funds necessary for paying it when due, and generally gives in return his own acceptance of another like bill, known in the mercantile world as a cross acceptance. When one or more names have thus been obtained sufficient to give currency to the bill, it is discounted, and the money applied to the necessities of the trader. As this bill falls due the same operation is often repeated in order to raise money, until, the system of expedients failing at last, the ruin of the insolvent trader himself is accomplished, and not unfrequently draws along with it others who, unfortunately or imprudently, may have become parties to these unsubstantial representatives of value. Of the more serious mischiefs of this

practice, such as the temptation to forgery by the use of fictitious names as drawers or payees, it is perhaps useless to speak, because few men at first seriously contemplate the commission of a crime, but are rather drawn into it by circumstances not foreseen or not appreciated; but the reflection that it is a foolish and improvident practice—that, in addition to the loss of credit which it is sure to occasion, there is the certain expense of stamps and higher rates of discount, and, moreover, a *double liability* in respect of every shilling for which cross acceptances are given—may perhaps have some effect in deterring honest men, however necessitous, from having recourse to this fatal expedient.

Viewed as a legal instrument, a bill of exchange, as well in its original formation as in its successive transfers, is an assignment of a debt by which the right of the original creditor to sue for and obtain payment is transferred to the holder for the time being. The Roman law presented no obstacles to such a substitution; and in those countries, therefore, which had adopted the Roman law the negotiation of bills found no impediment. But it was a principle of the common law of England that the assignment of things not in possession, such as a debt or right, was in truth the assignment of suits at law, and the validity of such transfers was not recognized by it. But in the case of bills of exchange the principle of law yielded to general convenience; and the negotiability of foreign bills was recognized by the English law. It was not, however, until three centuries later that the negotiability of inland bills was recognized by the courts, unless on proof of some special custom of trade; but expediency finally prevailed, and at the present day, as well by the common law as by the statutes of 9 & 10 Will. III. c. 17, and 3 & 4 Anne, c. 9, they stand on the same general footing as foreign bills. It is this assignability, vesting in the holder a right of action against the original parties, which chiefly distinguishes a bill of exchange from every other form of legal contract. Another important privilege is, that though a simple contract debt, and as such requiring a *consideration* to give it legal efficacy, the consideration is presumed until the want of it be shown. It is available, therefore, in the hands of a *bonâ fide* holder, upon merely formal proof of title by the signature of the party to be charged; that is to say, it is unnecessary to prove value given, unless it be first shown on the other side that the bill is in some stage or other tainted with an illegality, and the *bonâ fides* is assumed until it shall be made to appear that the holder was, at the time of making it, privy to that illegality. If the bill be lost, the debt is discharged; but by a recent Act the owner may sue on the instrument, and recover the money, on giving an indemnity to the satisfaction of the court. When two or more persons, not being partners, join in making a promissory note, it may either be a joint or joint and several note. It is joint when there is only one promise, although made by more than one person; and joint and several when there is a separate or several promise of each maker, as when the words "we and each of us" are used. It is now legal to sue both makers on a joint and several note, either together or separately; but upon a joint note, there being but one promise, both joint makers must be sued together, and a discharge of the one is a discharge of the other. When a bill has passed through a number of hands, the whole of the indorsees are bound for payment to the holder in addition to the drawer and acceptor, except when such indorsement has been given "without recourse." In 1882 the law with respect to bills of exchange was codified into a single Act—the 45 & 46 Vict. c. 61—and for the first time the law of England and Scotland were brought into perfect consistency on the subject. Some differences still exist in details chiefly relating to judicial procedure.

BILL OF HEALTH. See QUARANTINE.

BILL OF INDEMNITY, an annual Act of Parliament passed for the relief of those who have unintentionally omitted to take the oaths and assurances required by law of those who are admitted to any public office, or who have been unavoidably prevented from doing so.

BILL OF LADING, an acknowledgment signed usually by the master of a trading ship, but occasionally by some person authorized to act on his behalf, certifying the receipt of merchandise on board the ship, and engaging, under certain conditions and with certain exceptions, such as the act of God, the king's enemies, &c., to deliver the said merchandise safely at the port to which the ship is bound, either to the shipper, or to such other person as he may signify by a written assignment upon the bill of lading. The conditions stipulated on behalf of the master of the ship are, that the person entitled to claim the merchandise shall pay upon the delivery of the same a certain specified amount or rate of freight, together with allowances recognized by the customs of the port of delivery, and known under the names of *primage* and *average*. *Primage* amounts in some cases to a considerable percentage (10 or 15 per cent.) upon the amount of the stipulated freight, but the more usual allowance under this head is a small fixed sum upon certain packages. This allowance is considered to be the perquisite of the master of the ship. *Average*, the claim for which is reserved against the receiver of the goods, consists of a charge divided *pro rata* between the owners of the ship and the proprietors of her cargo for *towage*, *pilotage*, &c. Three sets of all bills of lading are made out on stamped paper; one of these should be remitted by the first post to the consignee, a second being sent to him by the ship; the third is retained by the shipper of the goods. A stamp duty of 6*d.* is charged on each bill of lading. It cannot be stamped after it is executed; and a penalty of £50 is incurred by making a bill of lading not duly stamped (33 & 34 Vict. c. 97, s. 56, and sch.) In case the ship should be lost, when the goods are insured, the underwriters require the production of one of the copies of the bill of lading on the part of the person claiming under the policy of insurance, as evidence at once of the shipment having actually been made, and of the ownership of the goods. By the Act 6 George IV. c. 94, s. 2, it is declared "that any person in possession of a bill of lading shall be deemed the true owner of the goods specified in it, so as to make a sale or pledge by him of such goods or bill of lading valid, unless the person to whom the goods are sold or pledged has notice that the seller or pledgor is not the actual and *bonâ fide* owner of the goods." But this Act having been found to be not sufficiently extensive, that of 18 & 19 Vict. c. 111 now regulates this subject. In this Act it is specified that "every consignee of goods named in a bill of lading, and every indorsee thereof, has all the rights and is subject to the same liabilities in respect of the goods as if the contract contained in the bill of lading had been made with himself."

The property in the goods represented by a bill of lading can be assigned, like a bill of exchange, by either a blank or a special indorsement; and as, in the event of the first mode being used, the document might accidentally fall into improper hands—a fact which the master of a ship could not reasonably be expected to discover—it is manifestly only justice to shield him from responsibility when acting without collusion. Should he, on the other hand, act either negligently or collusively in the matter, the law will compel him to make good their value to the real owner.

Every bill of lading in the hands of a consignee or indorsee for valuable consideration, representing goods to have been shipped, is conclusive evidence of such shipment, as against the master or other person signing the same, less such holder of the bill of lading shall have had actual notice at the time of receiving the same that the goods had not in fact been laden on board.

As already stated, it is usual to sign and deliver three bills of lading, and hence it is possible that there may be conflicting demands upon the captain by the different holders. In such a case he is required to act in good faith and according to the best of his judgment, and to make delivery of the goods to the person who *first* demands them, upon presentment of the bill of lading, provided the circumstances be not such as to justify a suspicion of his having unfairly obtained possession of it.

It was also decided in 1882 that the same rule applies to warehousemen who have taken the custody of the goods on the unloading of the ship, and who then take the place of the ship's owner or master. In the case referred to, a firm of merchants having obtained a loan from their bankers on security of a bill of lading, which they duly indorsed and delivered to the bankers, afterwards removed the goods from the warehouse of the docks where they had been deposited, by means of the second bill of lading. They soon afterwards went into liquidation, and the bankers, finding the Dock Company had delivered the goods, brought an action against the latter to recover their value. The case, which excited considerable interest, and was carried through all the courts, was finally decided in favour of the Dock Company. In giving the final decision Lord Blackburn pointed out the danger involved in the preparation of three bills of lading, and suggested that with the improved methods of communication which now prevail, a single bill, with one or more certified copies, would be more safe and convenient. This suggestion has received the support of certain mercantile journals, and may possibly lead to an alteration in the custom which has hitherto prevailed.

Great inconvenience sometimes arises if any irregularity occurs in a bill of lading, as by the regulations of some countries a mistake often leads to the infliction of severe penalties.

BILL OF MORTALITY. Bills of mortality are returns of the deaths which occur within a particular district, which returns specify the number that died of each different disease, and show, in decennial or shorter periods, the ages at which death took place. The London bills of mortality were commenced in 1592 after a great plague, but were not continued uninterruptedly until after 1603. It was from the data afforded by these accounts that the first tables of mortality were computed. They are now superseded by the more complete and accurate returns prepared and published by the registrar-general.

BILL OF RIGHTS is the name commonly given to the statute 1 William and Mary, s. 2, c. 2, in which is embodied the Declaration of Rights, presented by both Houses of the Convention to the Prince and Princess of Orange, in the Banqueting House at Whitehall, on the 13th of February, 1689, and accepted by them with the crown. The Bill of Rights was originally brought forward in the first session of the Parliament into which the Convention was transformed; but a dispute between the two Houses with regard to an amendment introduced into the bill by the Lords, naming the Princess Sophia of Hanover and her posterity next in succession to the crown after the failure of issue to King William, which was rejected in the Commons by the united votes of the High Church and the Republican parties, occasioned the measure to be dropped, after it had been in dependence for two months, and the matter of difference had been agitated in several conferences without effect. The bill was, however, again brought on immediately after the opening of the next session, on the 19th of October, 1689, and the amendment respecting the Princess Sophia not having been again proposed, it passed both houses, and received the royal assent in the same shape in which it had formerly passed the Commons, with the addition only of a clause inserted by the Lords, which enacted that the kings and queens of England should be obliged, at their coming to the crown, to take the test in the first Parliament that should be called at the beginning

of their reign, and that, if any king or queen of England should embrace the Roman Catholic religion, or marry with a Roman Catholic prince or princess, their subjects should be absolved of their allegiance. This clause is stated to have been agreed to without any opposition or debate.

The Bill of Rights, after declaring the late king, James II., to have done various acts, which are enumerated, utterly and directly contrary to the known laws, and statutes, and freedom of this realm, and to have abdicated the government, proceeds to enact, among other things, as follows:—

1. That the pretended power of suspending of laws, or the execution of laws, by regal authority, without consent of Parliament, is illegal.
2. That the pretended power of dispensing with laws, or the execution of laws, by regal authority, as it hath been assumed and exercised of late, is illegal.
3. That the commission for creating the late court of commissioners for ecclesiastical causes, and all other commissions and courts of the like nature, are illegal and pernicious.
4. That levying of money for or to the use of the crown, by pretence of prerogative, without grant of Parliament, for longer time, or in other manner, than the same is or shall be granted, is illegal.
5. That it is the right of the subjects to petition the king, and all commitments and prosecutions for such petitioning are illegal.
6. That the raising or keeping of a standing army within the kingdom in time of peace, unless it be with consent of Parliament, is against law.
7. That the subjects which are Protestants may have arms for their defence, suitable to their condition, and as allowed by law.
8. That election of members of Parliament ought to be free.
9. That the freedom of speech, and debates or proceedings in Parliament, ought not to be impeached or questioned in any court or place out of Parliament.
10. That excessive bail ought not to be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.
11. That jurors ought to be duly impanelled and returned, and jurors which pass upon men in trials for high treason ought to be freeholders.
12. That all grants and promises of fines and forfeitures of particular persons, before conviction, are illegal and void.
13. And that, for redress of all grievances, and for the amending, strengthening, and preserving of the laws, Parliaments ought to be held frequently. See *PETITION OF RIGHT*.

BILL OF SALE, a deed or writing under seal, the evidence of the sale of goods and chattels movable, and of furniture, stock, fixtures, and the like. Bills of sale are generally used where the possession of the property is not intended to be parted with. Formerly these documents gave rise to great frauds upon creditors, as it was competent for a debtor to assign his goods and still be apparently the owner, and so obtain credit. But by the 17 & 18 Viet. c. 36, it was provided that all instruments passing property of the above description, where the possession is not parted with, shall be registered within twenty-one days of their execution. Thus full notice is given to all persons dealing with the person giving the bill of sale; and a still further protection to the public was given by the Bills of Sale Act of 1866, which required that the registration of these instruments should be renewed every five years.

The practice, however, notwithstanding these amendments, still continued to give rise to grave abuses, not only as affecting creditors, but such bills being demanded by usurious money-lenders, were often used without scruple, as means of plundering their unfortunate debtors. Such persons having obtained a bill of sale as security for a small loan, were often enabled, by collusion with an auctioneer, to obtain many times the value of the money advanced, and great cruelty was thus frequently perpetrated with impunity. To remedy these evils an Act was passed in 1878, but as many of them still continued, this was further amended by the Bills of Sale Act of 1882, which made some important alterations in the law which had hitherto prevailed. By this Act it was provided that all bills of sale given for sums under £30 should

be absolutely void, although in the year previous to the passing of the Act between 14,000 and 15,000 bills of sale had been registered for sums under £20. Another very important point is that the holder of a bill of sale is now deprived of the preference which was given to him by the Act of 1878 over the ordinary creditors of a trader who becomes bankrupt. In case of bankruptcy the debtor's goods will in general be distributed among the creditors instead of being a good security for the debt of one to whom a bill of sale has been given. For the Act repeals the innovation of the statute of 1878, which says that chattels comprised in a bill of sale "shall not be deemed to be in the possession, order, or disposition of the grantor . . . within the meaning of the Bankruptcy Act." Another thing against which a bill of sale affords no protection is the recovery of taxes and poor and other parochial rates. It is also necessary to set forth in a bill of sale an inventory of all the personal chattels comprised in it, as it is void, except as against the grantor, in respect of any chattels not so specifically described. Moreover, it is similarly void, as regards property acquired after the execution of the bill, except that growing crops may be affected by a bill where they are actually growing at the time of execution, and also fixtures, plant, or trade machinery that are substituted for others of the same kind. The Act sets forth the five classes of reasons which alone will make property liable to be seized under a bill of sale. They are (1) if the debtor make default in payment at the proper time of the sum borrowed, or in the performance of any agreement that is contained in the bill and is necessary for maintaining the security; (2) if he become a bankrupt, or suffer the goods to be distrained for rent, rates, or taxes; (3) if he fraudulently remove the goods from the premises; (4) if he fail, without reasonable excuse, to produce upon demand of the lender the last receipt for rent, rates, and taxes; and (5) if execution be levied against the goods of the debtor under a judgment of law. When property is seized under a bill of sale, it must not be removed or sold until after the expiration of five days; and during that time a judge, if he is satisfied that by payment of money or otherwise the cause of seizure no longer exists, may, on the application of the debtor, restrain the removal or sale, or make any other order that seems just.

This Act contains a form according to which every bill given by way of security for the payment of money is to be made; and it is only with this kind of bill that the Act deals. It is now no longer necessary for the execution to be attested by a solicitor, or for the attestation to state that before execution the effect of the transaction had been explained by him to the borrower. The attestation must be merely by one or more credible witnesses not being a party. In default of attestation, of registration within seven days, and of the true consideration being set forth, the bill is absolutely void in respect of the chattels comprised therein.

Another noticeable point in the Act is that provision is made for local registration. Where the residence of the borrower or the property is outside the London bankruptcy district, the registrar is directed to transmit an abstract of the bill to the county court registrars of the districts in which the property and the residence are.

This instrument, except as to the transference of ships, is unknown to the law of Scotland. Though by that law sale is a consensual contract, yet the seller does not by completion of the contract alienate the subject—he only becomes bound to alienate it, and this is done by delivery. Hence formerly, as the property of goods sold but undelivered remained with the seller, they were liable in the event of his bankruptcy to be attached by his creditors, even though the price had been paid. While the law stood thus, any document such as a bill of sale without delivery would have been invalid, and with delivery would have been

unnecessary. But by the Act 19 and 20 Vict. c. 60 the old law has been so far altered that creditors of the vendor cannot now by any form of diligence or legal process attach goods validly sold, though undelivered. The only exception to this would seem to be where from the *laches* of the vendee such goods have been allowed to become a source of credit to the vendor—as, for example, where he has been allowed to retain their beneficial use. This alteration in the law may in some cases introduce difficulties that would be avoided if bills of sale with corresponding registration were introduced. This has, however, not taken place. See SALE.

BILL OF SIGHT is an imperfect entry of goods at the custom-house, when the importer is not precisely acquainted with their nature or quantity. A bill of sight must be replaced by a perfect entry within three days after the goods are landed.

BILL OF STORE and **STORE-BILL**. A bill of store is a document granted by the officers of customs on the return to this country of British goods, in order that they may be admitted without payment of the duties to which foreign goods of a similar description are liable, on the identification of British marks and brands. There is not now, as formerly, a restriction as to the time within which British goods must be reimported. A store-bill is a license granted to ship goods, as stores, free of duty, for consumption and use on the voyage.

BILL OF VICTUALLING. For the protection of the customs duties the master of every vessel leaving a British port on a long voyage is required to make out a list of such victuals and stores as may be required for the use of the crew and passengers, and submit it to the custom-house authorities for their approval. When this is given the stores are shipped on board, and a list is drawn up which must give a correct account of them, together with any other stores on board that have been shipped from the bonded warehouse or for drawback. When this list is countersigned by the customs officers it constitutes the victualling bill, and when there is nothing but stores upon a ship it serves for the certificate of clearance. If after clearing outwards a vessel be found to possess any such stores which are not indorsed on the victualling bill, they may be forfeited.

BILLERICAY, a small town in Essex, 23 miles E.N.E. from London, stands on an eminence which commands a beautiful prospect over the valley which extends southwards to the Thames. It has manufactures of silk-braid and lace.

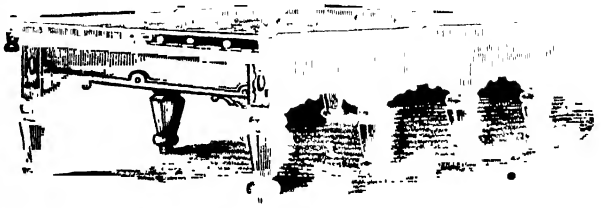
BILLET, in architecture, is an ornament of the Norman style, formed by cutting a moulding into notches resembling billets of wood. These are sometimes arranged in several rows, in which case the billets of one row are placed above the spaces of the other row. In heraldry, billets are represented by small oblong figures, sometimes taken to represent bricks, but more commonly *billets doux*. The latter interpretation is generally adopted by English heralds. In Germany they are called *Schindeln*, "slingles."

BILLETING is the name given to a method of provisioning and lodging soldiers when not in camp or barrack. In former times the military commanders appear to have quartered their soldiers upon the inhabitants of any town through which they were passing, or where they were stationed, very much as they pleased. The hardships and oppression of the practice, however, led to the passing of the Mutiny Act in 1689, which provided that the accommodation of soldiers should be intrusted to the chief civil magistrate of a town, who should allot them among the inhabitants as fairly as he could. In 1745 a further Act was passed, which restricted the billeting of soldiers to certain specified traders, and exempted all others from the burden. The law is now regulated by the Army Regulation Act of 1879, which provides that officers and soldiers on active

service may be billeted on any victualling house, inn, hotel, livery stable, alehouse, or in the house of any seller of wine by retail to be drunk in such house, or the houses of persons selling spirits, cider, &c., by retail. Private houses and canteens are exempted, and so are also those persons who are licensed to sell wines and spirits by retail, but not to be drunk on the premises. It is usual where accommodation is required in a county town for troops who are passing through, for the commanding officer to send to the chief of the police, or billet-master, a notice demanding billets for a specified number of men for a given time. That officer then allots the men to the various houses liable, of which a list is kept for this purpose; and on the arrival of the soldiers they are provided, through their non-commissioned officers, with a written order, termed a billet, addressed to the keeper of the house who has to provide for them. They must be supplied with food, drink, sleeping accommodation, and the materials necessary for cleaning arms, accoutrements, &c. In compensation the sum of 1s. 1½d. is allowed for one hot meal of meat, bread, and vegetables, with pepper, salt, and vinegar, and a quart of small beer, and 2½d. for a bed. The sum allowed for oats, hay, and straw for the horses is 1s. 9d. each per day; 2s. is also allowed for lodging and attendance for each officer, who provides and pays for his own maintenance. If a victualler has not sufficient accommodation in his own house he must provide it in the immediate neighbourhood. The disbursements are made by the regimental paymaster, and the houses are visited by the officers at dinner-time to see that the men are provided with proper food and the horses properly fed and groomed.

BILLIARDS, like the greater number of games which are prevalent in modern Europe, is of French invention. Soon after the French, the Germans, the Dutch, and the Italians brought it into vogue throughout the Continent; and in a few years afterwards it became a favourite diversion in England, particularly among persons of rank. The precise period of its introduction into this country is not known; but as it is mentioned by Shakspeare the game must, at least, have been somewhat familiar to us in the sixteenth century. As it is replete with entertainment, and attended with that kind of moderate exercise which renders it, at the same time, both agreeable and conducive to health, it will in all probability long remain in fashion. The game of billiards is played by two or more persons, with ivory balls, upon a table which, in different countries, is made of different shapes. But the established table is 12 feet long by 6 feet wide, and has a space within the cushions of two equal squares 5 feet 10½ inches across. It is supported on eight legs, and its height is 3 feet from the ground to the top of the cushion. The finest slate is used to give a true surface, the slabs being covered with green cloth. Six pockets are provided, one at each corner, and one midway at each of the longer sides. Twenty-eight inches from the lower or bottom cushion a line, called the baulk-line, is drawn across the table, and from the centre of this line a semicircle is drawn between it and the lower end from 21 to 23 inches in diameter, the space inclosed being called "baulk." In the middle of the baulk-line is marked the baulk spot, in the middle of the table the centre spot, and in a line with these two marks, and 13 inches from the upper end, is the red-ball spot. The cushions, which were formerly made of felt, are now padded with india-rubber; and on what is called a "fast" table a ball may be made to traverse the table eight times from a single stroke with the cue. The latter is a long smooth stick, thick at one end, and tapering to a point at the other, made of ash, box, lance, or other hard wood. The point is covered with leather, which is rubbed with chalk before and during play, so as to prevent it slipping when striking the ball. In former times an implement called a mace was frequently

used for striking the balls. It was a long slender stick, provided with a club at the striking end, but it is now rarely seen. For the common game, usually termed "billiards," three balls are required. These should be made of the finest African ivory, should be perfectly spherical in shape, and in size from 2¼ to 2½ inches in diameter. Two of these balls are white, one of them being marked with a black spot to distinguish it, and the other ball is coloured red. In playing the cue is held in the right hand, and is supported at about a foot from the tip by the forefinger and thumb of the left hand, which rests upon the table. The objects of the player are twofold—first, by striking his own ball against the red ball or that of his adversary, to drive either it or them into the pockets; second, to make "a cannon," that is, to touch both of the other balls with his own at one stroke. When a player succeeds in driving his adversary's ball into a pocket the stroke is called a white winning hazard, when he pockets his own ball from that of his adversary the stroke is called a white losing hazard. When the red ball is pocketed it is called a red winning hazard, and when the white ball is pocketed off the red a red losing hazard. These terms are derived from the old game of billiards, which was played with two white balls only, and the meaning is now reversed, and the winning hazard is the least advantageous. The points reckoned are two for a cannon, two for a white hazard, and three for a red hazard. A miss counts one, and a "coo" (*coup*) is when the ball jumps off the table or runs into a pocket without striking another ball. Ten is the highest number of points which can be made by a single stroke, and this is obtained when the player cannons by playing at the red first, and then pockets all the balls. The old game was limited to twenty-one points, but the usual game now is for fifty points, though it may be extended to any number up to 1000, the latter number being generally chosen for public matches between professional players. The game may be played by two, three, or four persons, the most



common being that of two persons, a third being employed as marker.

The only other games which need be mentioned are "pool" and "pyramids." The former, which may be played by two or more persons up to fourteen, consists entirely of winning hazards. Each player contributes his stake to the pool, and being provided with a ball starts on the game with three chances or lives. The white ball is placed on the spot, and red plays at it from the baulk semicircle, and the other players follow in rotation, each one playing on his predecessor's ball. Every time a ball is pocketed the owner pays a sum previously agreed upon to the player, and loses a life, and the striker plays again. When any player has lost three lives he retires from the game. A player loses a life to the owner of a ball which he plays on and misses, or if he makes a losing hazard after striking it. A life is also lost by playing at the wrong ball, or forcing a ball over the table. The rules of this game are necessarily numerous and somewhat intricate.

"Pyramids" is played by two or four persons; in the latter case the players take sides, two against two. Fifteen red balls and one white are required for this game, and they are usually made smaller than the ordinary balls—being about 2 inches in diameter. The red balls are placed upon

the table in the form of a pyramid, the apex being towards the player; the white ball is used in common by all who are playing. The game consists entirely of winning hazards, the player who succeeds in pocketing the largest number of balls winning the game.

In France the billiard tables are 8 feet long by 4 wide, and are made without pockets, as the game usually played consists entirely of cannons.

BILLINGSGATE, a gate, wharf, and fish-market a little below London Bridge, to the W. of the Custom-house. Stowe, on the authority of Geoffrey of Monmouth, says that the gate was built by Belin, a king of the Britons, whose ashes were set upon a pinnacle over it. In 1676 John Boydall mentions it as a wharf or quay for ships. It was made a free market in 1669, and increased facilities in the means of communication and conveyance have rendered it the first market of the kind in the world. A new edifice was opened in 1849, but this having long been felt to be of too small capacity, a much larger building was erected in 1876-77.

Billingsgate is the most extensive fish-market in the world, the weekly supply averaging by water 800 to 850 tons, and by land as nearly as possible double that amount. And as the whole of this enormous mass has to be carried on men's shoulders from ship or waggon to salesman's stall, there to be disposed of in some four hours, more or less, among the thousands of fishmongers and costers, large and small, and then all carried back again for distribution among the vans, carts, and barrows of the purchasers, some faint idea may readily be formed of the bewildering turmoil of the scene. Even this, however, is not all, for Billingsgate supplies not only London but a very large portion of England. From Brighton to Birmingham, from Epping to Exeter, the supply is furnished almost exclusively from Billingsgate, whilst a large proportion of the market supplies are sold twice over—the costers and smaller fishmongers being unable to take the large lots into which the stock is divided by the original salesman, and purchasing their modest supplies from the "Bammacee," who divides his purchases into parcels of sometimes even two or three sh. The market is at its height from 5 a.m. till about 9, by which time the greater part of the morning supply has been cleared off; but the market remains nominally open until 3 p.m., up to which period there is always a chance of the arrival of some belated craft with additional supplies.

It must not be supposed, however, that these chance arrivals are allowed to take any one by surprise. From whatever point of the shore the approach of any fish-laden craft is first noted, the electric wire conveys the intelligence forthwith to Billingsgate; but even this does not satisfy the exigencies of the modern fish-trade, and large numbers of pigeons are maintained for the express purpose of communicating with the shore from points on the open sea to which the ubiquitous wire is not yet accessible.

The staff of the market includes about 1100 licensed porters, besides costers, detectives, clerks, &c.; and the business, rough as it is, is conducted, so far as the official personnel is concerned, with machine-like precision and punctuality.

The fish is usually consigned to dealers or salesmen who have places in the market, and who supply the retail sellers. Salmon and eels are sold by weight, oysters and small shell fish by measure, and all other fish by tale. Mackerel are allowed to be sold on Sunday. The inadequacy of the market to supply so large a city as London, and the narrowness of the approaches to it, having long been apparent, an effort was made in 1882 to pass a bill through Parliament for the opening of an additional market in Shadwell. It was fiercely opposed by the corporation of the city of London, who were extremely anxious to retain their monopoly, and in their efforts they were supported at first by

the House of Lords. These efforts, however, aroused great indignation among the inhabitants of London, and the measure was ultimately passed.

Among the things for which Billingsgate is remarkable, we may mention the enormous physical strength possessed by some of the porters engaged there. Baskets of shell-fish weighing over 3 cwt. are lifted from the ground and carried up stairs, or up a ladder, by these men in the course of their ordinary work, the load being placed upon the head or the middle of the shoulders. Other points also noteworthy are the use of coarse and foul language by the lower class of its frequenters, which has rendered the name of the market synonymous with coarse ribaldry.

BILLITON, an island between the eastern coast of Sumatra and the south-western point of Borneo, in 3° S. lat. and 108° E. lon. It is about 60 miles long from N. to S., and 45 broad from E. to W. It is separated from Banca Island by Gaspar Strait, and from Borneo by Caranata or Billiton Strait. Population, 3000.

BILLOM, a town of France, in the department of Puy de Dôme, formerly the capital of the Limagne, is situated on a high hill 13 miles E.S.E. from Clermont, and has a tribunal of commerce, a college, a clerical seminary, and 3762 inhabitants, who manufacture linen, pottery, bricks, tiles, and lime; and trade in hemp, wool, corn, cattle, and timber. During the period of the League, Billom was a principal focus of the disorders that agitated Auvergne.

BILLON, in coinage, is a composition of precious and base metal, consisting of gold or silver alloyed with copper, in the mixture of which the copper predominates. The word came to us from the French. The Spaniards call billon coin *moneda de vellon*.

BILSTON, a market-town of England, in the county of Stafford, 2 miles S.E. from Wolverhampton, 11 miles N.W. from Birmingham, and 107 miles N.W. from London. The town stands on a rising-ground, and is very irregularly built. The principal streets contain some substantial and handsome houses, and within the last few years its appearance has been much improved; though, from the number of forges and collieries, it has a sombre aspect. On this account the country all around is usually designated the "Black Country." The principal buildings are—the parish church; St. Mary's, a fine structure, built in the Gothic style of architecture in 1830; and the Roman Catholic chapel, a handsome structure in the same style. The living is a curacy, within the jurisdiction of the Dean of Wolverhampton; the patronage is in the inhabitants at large—every householder, whether male or female, being entitled to vote at the election of the minister. There are places of worship for Nonconformists, and an endowed blue-coat school. Commemorative public buildings, in the Italian style, were erected in 1873, comprising a town-hall, free library, and municipal offices. An orphan cholera school was built and endowed in 1833 for the instruction of 450 orphans left destitute by the cholera, which raged in the town with fearful violence in the previous year. The building has since been converted into a chapel. Bilston forms part of the borough of Wolverhampton, with which it is intimately connected.

The town, which down to a comparatively recent period was but an inconsiderable place, is indebted for its growth and importance to the iron trade carried on in it and its immediate vicinity. Its advantages in this respect are not surpassed by those of any other place. Round the town are all but inexhaustible mines of coal and ironstone, the main bed of coal being 30 feet thick, with strata of ironstone both above and below. Manufactures in iron, from nails and wire to the heaviest articles, are largely carried on, and also manufactures in tin, japanned and painted iron goods, and coarse pottery. The japanned articles are of an inferior description to those made in Wolverhampton, and are chiefly exported to Russia, Spain, Norway, and

South America. An unusually large number of girls and women are employed, and the wages are consequently rather low. An excellent stone for grindstones, and a remarkably fine sand for iron casting, are plentiful near the town. The population in 1881 was 22,730.

BIM'ANA (Lat. "two-handed"), a name given by Cuvier, Hamilton, Smith, and others, to the first order of the animal kingdom, consisting of the one genus and one species *Homo* (Man); who, in contradistinction to the *Quadrumana*, has been physiologically described as possessing hands on the fore limbs, with opposable thumbs; a peculiar structure of the pelvis and feet, by which he is enabled to support an upright position; a difference in the form of his teeth and the adaptation of the organs of speech for articulated sounds; and, above all, in the superior magnitude and organization of his brain, and the manner of its convolutions. See **ANTHROPOLOGY**.

BIM'LIPATAM, a municipal town in Vizagapatam district, Madras. It is situated on the coast 18 miles N.E. of Vizagapatam, and 454 miles S.W. from Calcutta. As the chief port of the district, it enjoys a large trade. Though an open roadstead, the port is somewhat protected by the Upada and Sugar-loaf Headlands; and good anchorage, in $6\frac{1}{2}$ fathoms, can be obtained two miles from the shore. The river does not admit boats of more than 60 tons, and these only during a portion of the year. Tradition derives the name from Bhima, one of the Pandee princes, who is said to have founded the town. In the seventeenth century the Dutch erected a factory here, and held it till 1825, when it was ceded to the East India Company. Till 1816 Bilimpatam remained a mere fishing village, but in that year it began to attract European capital and enterprise. The present population is 9000.

BINARY THEORY. See **CHEMISTRY**.

BIN'CHE, a town of Belgium, in the Hainault province, is situated to the W. of Charleroi, on the right bank of the Haine, is a well-built walled town, with 6500 inhabitants. In a fine square, ornamented with a fountain, stand a church, a college, and an hospital. The principal industries are cutlery and hardwares, lace, paper, marble, and coal.

BIND-WEED. See **CONVOLVULUS**.

BING'EN, a town in the grand-duchy of Hesse-Darmstadt, with 6400 inhabitants, situated at the confluence of the Nahe and Rhine, was known to the Romans, who erected a castle here, at the point whence their military roads to Colone and Trèves diverged. In the middle ages it was a free town of the empire, and one of the earliest members of the confederation of Rhenish towns. During the Thirty Years' War it was repeatedly captured, and in 1689 it was totally destroyed by the French. Bingen carries on a good wine trade and a busy river and railway traffic. Above the town, and probably on the site of the ancient Roman fortress, rises the castle of Klopp, the towers of which afford an excellent view. Opposite the castle, on a quartz rock in the middle of the Rhine, is situated the Mouse Tower, which is said to derive its name from the well-known legend of the cruel Archbishop Hatto of Mainz. Having caused a number of poor people, whom he compared to mice bent on devouring the corn, to be burned in a barn during a famine, he was immediately attacked by mice, which tormented him day and night. He then sought refuge on this island, but was followed by his persecutors, and soon devoured alive. It is probable that the real name was not *Mause-Thurm*, but *Mauth-Thurm*, or Tower of Customs, and that it was erected in the middle ages for levying tolls. In 1866 the ruins were converted into a kind of watch-tower for making signals to steamers, which in descending the river are required to slacken speed here when other vessels are coming up the stream.

BING'HAM is a market-town of Nottinghamshire, 9 miles E. of Nottingham, and 119 from London by the Great Northern Railway. It is the largest place in the

vale of Belvoir, and consists chiefly of two parallel streets. It has a large market-place, in which a new cross was erected in 1861. The town has been much improved of late years and many good houses built. The Grantham Canal traverses the parish. Population of the township, 7000.

BING'LEY, a market-town in the West Riding of Yorkshire, 37 miles W.S.W. from York, and $206\frac{1}{2}$ from London, is situated on an eminence between the river Aire on the S.W., and the Leeds and Liverpool Canal on the N.E., the latter passing close to the town. It is an important station on the Midland Railway, which is carried under part of the town in an arched tunnel of masonry. Bingley consists principally of one long street, and contains a perpendicular church, a district church (1869), three places of worship for dissenters, a mechanics' institute (1864), and a well-endowed grammar-school. The worsted manufacture and cotton-spinning are carried on to a considerable extent in the town and neighbourhood, having been introduced about 1806. There are now more than twenty large worsted factories in the parish. Population of the town in 1881, 18,437.

BIN'NACLE, the box or case used on board ship to contain the compass and its appurtenances, as the lamp, &c. *Bittacle*, an abbreviation of the French word *habitable*, a small habitation, was the original form of the word. See **COMPASS**.

BINNEY, REV. THOMAS, D.D., a very able and distinguished Nonconformist minister, was born at Newcastle-on-Tyne in April, 1798, where he was apprenticed to a bookseller. When "out of his time," however, he entered the Independent training college at Wymondley as a student for the ministry. His first sphere of duty was at Newport, Isle of Wight, where he remained about five years. In 1829 he removed to the King's Weigh-house Chapel in Eastcheap, which had long been the principal Independent place of worship in London. Here his fame, both as a preacher and a writer, grew rapidly. In 1834 the Weigh-house Chapel was removed from Eastcheap to Fish Street Hill, and here Dr. Binney remained until 1871, when, through failing health and strength, he resigned his formal charge, though afterwards officiating occasionally. He visited Canada and the United States in 1815, and was very warmly received there. In 1848 he was elected chairman of the Congregational Union. In 1857 he paid a two years' visit to the Australian colonies. In preaching and in writing alike, Dr. Binney was earnest, persuasive, and sensible, though seldom eloquent. As a powerful controversialist, and as one of the most able ministers of his denomination, his reputation was made early, and it was steadily maintained during the whole of his long life. Dr. Binney's own religious faith may be best gathered from two of his pamphlets, "Dissent not Schism" and "Conscientious Clerical Nonconformity." He died 21th February, 1874.

BINO'MIAL THEOREM, by far the most important theorem in common algebra, was first announced by Newton. Binomial means an expression which contains two terms, such as

$$a + b \text{ or } b - c x.$$

The binomial theorem is frequently called on the Continent the *binome de Newton*, and is often incorrectly asserted to be engraved on his tomb in Westminster Abbey. In explaining this theorem, we shall consider ourselves as writing for those who have already such a knowledge of algebra as will enable them easily to recognize the various expressions of which we make use.

The binomial theorem, coupled with those preceding theorems from which it springs, is as follows:—

(1) If a be denoted by a^1 , a by a^2 , $a a$ by a^3 , &c., then

$$a^m \times a^n = a^{m+n} \text{ and } \frac{a^m}{a^n} = a^{m-n} (m > n).$$

(2) The equations in 1 will hold good when the symbol a' is considered, provided that a' always signifies *unity*.

(3) Or when negative exponents are employed, provided that

(4) Or when fractional exponents are employed, provided that

$a^{\frac{1}{2}}$ means the square root of a , $a^{\frac{2}{3}}$ the cube root of a , and also that $a^{\frac{1}{7}}$ means $(a^{\frac{1}{3}})^{\frac{1}{7}}$ where $a^{\frac{1}{3}}$ is the seventh root of $a^{\frac{1}{3}}$.

(5) *Binomial Theorem*. In all the preceding is, whether n be whole or fractional, positive or negative,

$$1 + n = 1 + \frac{n}{1}x + \frac{n(n-1)}{2}x^2 + \frac{n(n-1)(n-2)}{6}x^3 + \dots$$

the preceding being a series of an infinite number of terms in all cases except only where n is a positive whole number.

The p th term of the preceding expression is

$$\frac{n(n-1)(n-2)\dots(n-p+2)}{p!}x^p$$

expressing any term after the second. Therefore, by simply expressing n in number, it is over to which the binomial is to be raised to the p th power, &c.,

added from the formula to write down at once any power of a binomial.

BIOGENESIS. See SPONTANEOUS GENERATION.

BIOGRAPHY, a modern term, formed from the Greek *bios*, life, and *grapho*, to write, and therefore signifying literally "life writing." It is that department of literature which treats of the actions and fortunes of individuals. Biography is commonly distinguished from history by the latter term being confined to the narration of the actions and fortunes, not of individuals, but of the large communities of men called states and nations; but properly biography is only a branch of history. Thus Thomas Stanley, in the preface to his "History of Philosophy," observes, "There are two kinds of history: one represents general affairs of state, the other gives an account of particular persons, whose lives have rendered them eminent." At the time when this was written (the middle of the seventeenth century) the word biography, we believe, had not been invented.

Of professed biographical works, by far the earliest that has come down to us from the Greeks is the "Parallel Lives" of Plutarch, written in the second century of our era. This work comprehends distinguished characters in all the departments both of military and civil life. Another collection of very small value is that of the "Lives of Eminent Greek and Roman Commanders," written by Cornelius Nepos, in the reign of Augustus. There is also the work entitled "The Lives of the Twelve Cæsars," by Suetonius, which, however, is not necessarily in some degree of an historical character.

Since the revival of letters, numerous biographical works have appeared in every language of Europe. The lives of eminent statesmen, military commanders, admirals, navigators, travellers, highwaymen, and various other descriptions of persons, either in all countries, or in some one country, have frequently formed the subjects of distinct works.

Of the principal collections of exclusively British biography, an account is given in the preface to the first edition of the "Pteraphia Britannica." That work was begun to be published at London in 1747, and was completed in five vols. folio, in 1766. A new and much extended edition of the "Biographia Britannica" was begun in 1778 by

Dr. Andrew Kippis, but was not carried further than the fifth volume (folio), which brings down the alphabetical list of names only to the letter F.

Of general biographical dictionaries, the "Dictionarium Historico-Geographico-Poeticum" of Charles Stephens, published in 4to, at Geneva in 1566, two years after the death of the author, may probably be regarded as the earliest; but this work, as its title indicates, contained many others besides biographical articles. The first "English General Biographical Dictionary" appeared in 1762, in eleven vols. 8vo. It is the last edition of this work which goes by the name of Chalmers' "Biographical Dictionary," which having been begun to be published in 1812, was completed in 1817, in thirty-two vols. 8vo. These works have occupied a most important place in the literature of biography. But even Chalmers' dictionary was very defective. Great improvement was required both in the form and the matter of a work of this kind. The most complete English work in this department is "The Imperial Dictionary of Universal Biography," in six volumes (W. Mackenzie, London). The great French work, the "Biographie Universelle," was begun in 1810, and completed in 1828. A new edition of this work was published in 1866. The first volume of an English Dictionary of National Biography, edited by Mr. Leslie Stephen, was issued in 1884.

BIOLOGY is the science which treats of the phenomena manifested by living bodies. Living matter can be distinguished from non-living by various characteristics. According to Herbert Spencer's definition—(1) Life contains a process or processes of change; (2) the change is not a simple or individual act, but a series or succession of changes; (3) life involves a plurality of simultaneous as well as successive changes; (4) the changes are heterogeneous, or various in character; (5) the various changes all combine to a definite result; (6) finally, the changes are in correspondence with external coexistences and sequences. Or, to put it in a shorter form, life is the continuous adjustment of internal relations to external relations. Bain points out that in this definition there is no direct allusion to the organized structure, or the individual and independent existence of living bodies.

Four elements, viz. carbon, hydrogen, oxygen, and nitrogen, are the chief constituents of all living matter. These form a very complex compound called protein, which, united with a large proportion of water, forms the chief constituent of what is styled by Huxley "the physical basis of life"—protoplasm. The simplest living things are single cells, and higher forms are aggregates of such cells variously modified. The different forms of plants and animals are so numerous that it is necessary, in order to be able to deal with them, to adopt some method of CLASSIFICATION. Co-ordinate with the study of structure is that of function, under the head of PHYSIOLOGY. The reaction of structure and function is the basis of the hypothesis inseparably connected with the name of Charles Darwin—EVOLUTION. Another very important department of biology is the investigation of the areas of the earth's surface occupied by the various groups, and for past ages geology comes in to aid in this study of DISTRIBUTION.

BIOTITE is a rock-forming mineral, which enters largely into the composition of some metamorphic and eruptive rocks, as certain varieties of gneiss, granite, or trap rocks, where it usually occurs as small scales or as bunches of small scales.

It belongs to the mica group, and is the most common variety of the black or dark-coloured section. It is essentially a magnesium mica, being a silicate of magnesium, potash, iron, and alumina. It varies in hardness from 2.5 to 3, and in specific gravity from 2.7 to 3.1. The colour is usually black or dark green, but their laminae by transmitted light appear brown, green, or blood-red. The cleavage is basal and very perfect, so that the mineral is

usually found as disseminated scales, or as thin, flexible, and elastic laminae. The crystalline system is hexagonal. Under the microscope, when not viewed perpendicular to the basal section, it appears finely striated longitudinally, and is strongly dichroic. Sections cut parallel to the basal plane are dark between crossed Nicol's prisms.

BIR, the ancient *Birtha*, according to D'Anville, a town of Mesopotamia in Asiatic Turkey, in $36^{\circ} 59' N.$ lat., and $38^{\circ} 7' E.$ lon., 144 miles N.E. from Aleppo. It is situated on the side of a very steep hill on the east bank of the Euphrates. Bir has long been the point where caravans and travellers from Aleppo to Orfah, Diarbekir, Bagdad, and Persia cross the Euphrates, the passage being effected in large boats. A ferry seems to have crossed the river at this spot from time immemorial—Abraham himself having made use of it, according to tradition, on his passage from Huran to Canaan.

There are perpendicular cliffs within and around the town in different directions, which are composed of a hard chalky stone, and have furnished the material with which the town is built. Thus the houses and the rocky slope on which they stand present to a spectator on the opposite side of the river a mass of glaring white, which greatly distresses the eye when the sun shines, while the fine impalpable powder is no less annoying when the wind blows. The environs are, however, very pleasant. Captain Chesney says the houses are from 1800 to 2000. There are five mosques with tall minarets, a public bath, a caravanserai, a few coffee-houses, and a small but ill supplied bazaar. The streets are narrow, but, from the steepness of the site and the material of the buildings, they are more than usually clean. Except on the side towards the river, the town is surrounded by a wall of excellent masonry, with towers at the angles, and pierced with loopholes throughout. There is an old ruined fortification in the centre of the town, on a height of the rock; and all along the north end of the town, where a perpendicular cliff faces the water, are the walls and towers of an ancient castle, which, though a ruin, still presents an imposing appearance. Bir is the point from which, a few years ago, it was proposed to navigate the Euphrates by steam. (Chesney's "Narrative of Euphrates Expedition," London, 1868.)

BIRBHUM, a district in the Lieutenant-governorship of Bengal, lying between $23^{\circ} 33'$ and $24^{\circ} 9' N.$ lat., and between $87^{\circ} 7'$ and $88^{\circ} 4' E.$ lon. The area is 1344 square miles, and the population 700,000.

The eastern portion of the district is an alluvial plain, presenting the ordinary features of the Bengal lowlands; towards the west the ground rises, the surface consisting of undulating beds of laterite, which rest on a basis of rock. Granitic veins traverse the district in parts, occasionally appearing on the surface. No important or navigable river flows through Birbhum; the largest stream is the Ajai, which forms the southern boundary line of the district.

The population is entirely rural, the only large town being Suri, which has a population of 9000.

The principal crop in Birbhum, as throughout the rest of Bengal, is rice. During the last quarter of a century the area under this staple has greatly extended, by the reclamation of large tracts of jungle land. The district is not liable to droughts, floods, or other natural calamities, although it has occasionally suffered from scanty rainfall. The principal manufacture is silk, which is produced in the eastern part of the district—the village of Ganutia, on the north bank of the Mor, being the headquarters of the industry. Cotton weaving is also carried on to a considerable extent, giving employment to 7500 cotton weavers. The preparation of indigo and shellac are among the other industries.

BIRCH is the English name for *Betula*, a genus of hardy trees or shrubs, some of the former of which are among the most useful plants of northern latitudes. It gives its name to the BETULINE tribe.

As birches are of considerable importance in cold climates, we shall briefly notice some of the more remarkable species, according to the prevailing geographical distribution.

Betula alba (the Common Birch) is a native of Europe from the most northern to the most southern countries, in the latter, however, not appearing except on mountains of considerable elevation. On Etua it does not occur below 4760 feet above the sea. It is also found in North America, and in Mid and North Asia. Although this species is not much valued for its timber, it is extremely useful for many other purposes. Hoops are manufactured from it, as well as yokes for cattle, bowls, wooden spoons, and other articles in which lightness without much durability is sufficient; baskets and hurdles are often made of part of the shoots; and from the rising sap, extracted by means of openings cut into its young sapwood in the spring, and fermented, a kind of wine is obtained which is of an agreeable quality, but will not keep. The birch naturally grows in poor, sandy soil, on which it thrives fully as well as in that of a more fertile kind. *Betula pendula* (the Weeping Birch), *Betula pubescens* (the Downy Birch), are varieties of *Betula alba*. *Betula nana* (the Dwarf Birch) has the same distribution; it affords to the Laplanders a large part of their fuel, and its winged fruits are a favourite food of the ptarmigan.

Betula Bhopatra (Indian Paper Birch) is a tree found in the northern provinces of India, where it was discovered by Dr. Wallich. Its thin delicate bark furnishes the masses of flexible laminated matter, of which great quantities are brought down into the plains of India for lining the tubes of hookahs. It is also a native of the mountains of Japan.

Betula acuminata (Tapering-leaved Birch), *Betula nitida* (Shining Birch), *Betula cylindrostachys* (Cylindrical Spiked Birch), are natives of the East Indies.

Betula nigra (the Red Birch) is a native of the borders of rivers, where it grows associated with planes, maples, and willows, in the southern provinces of the United States, delighting as much in heat, according to Michaux, as many other species do in cold, and therefore the best adapted for planting in the southern parts of Europe. It is a handsome species, growing as much as 70 feet high, and from 2 to 3 feet thick, and is remarkable for its bark not being white and shining, but brown, dotted with white, and slightly wrinkled.

Betula papyracea (the Paper or Canoe Birch), a variety of *Betula alba*, is the most valuable of the birches. It is a native of North America, where it grows in great quantities. The slopes of hills and valleys, where the soil is of good quality, are its favourite stations; in such places it often acquires the height of 70 feet. Its wood is sometimes used in North America for cabinetmaker's work; but it is not of much value for exposure to weather, as it soon decays if subjected alternately to damp and dryness. Its bark is the part which is the most esteemed, and this part is said to be so durable that old fallen trees are stated to be frequently found with their form so well preserved that one would think them perfectly sound, but upon examining them it is found that the whole of the wood is wasted away, and nothing is left but the sound and solid case of bark. This part is used for a number of useful purposes. Log houses are sometimes thatched with it; little boxes, cases, &c., and even hats, are manufactured from it; but its greatest value is for making canoes.

Betula lenta (the Soft, Black, or Cherry Birch) produces very valuable timber, whence one of its American names is Mountain Mahogany. Its wood is hard, close-grained, and of a reddish brown; it is imported into this country in considerable quantity, under the name of American Birch, for forming the slides of dining-tables, and for similar purposes. *Betula excelsa* (the Yellow Birch) is remarkable for the bright golden yellow of its bark, which shines as if it had been varnished. Its wood is something like that of

the soft birch, but is not so good nor so dark coloured. This tree is considered by Regel to be merely a variety of *Betula lenta*.

All the species of birch, except the common birch and the weeping birch, are multiplied by layers in the usual way. The two others are propagated by their seeds, which may be procured in this country in great abundance. It is only necessary to sow them thin in beds as soon as gathered, covering them with not more than a quarter of an inch of light earth. The seedling plants should be bedded out when one year old, and after the second year, if properly managed, they may be transplanted to the plantation. When old they are transplanted with considerable difficulty.

BIRD or BIRDE, WILLIAM (musarion). See BYRDE.
BIRD OF PARADISE is the name of a family of birds, *Paradisidae*, nearly allied to the Crows, and belonging to the order *PASSERITES*. With no family of birds has fiction been more busy than with the birds of paradise. It is fabled that they passed their existence in the air, and there produced their eggs and young; the dew was their food, and it was only when they overtook them that they touched the ground. They had no legs on which to stand or perch, and their very plumes were won by the warrior in fight, or earned him invulnerable as Achilles.

"The Malay trade. Wallace in his 'Malay Archipelago,' gave them the name of 'manuk Dewata,' or God's birds; and the Portuguese, finding that they had no feet or wings, and not being able to learn any authentic names from them, called them 'passaroes de ar,' birds of the air, while the learned Dutchmen, who in Latin called them 'passerides,' or paradise birds. John van Linschoten gives these names in 1596, and says that no one has seen these birds alive, for they live in the air, always turning towards the sun, and never lighting on the earth till they die, for they have neither feet nor wings, as, he adds, may be seen by the birds carried to India and sometimes to Holland, but being very costly they were then rarely seen in Europe. More than a hundred years later, Mr. William Linnel, who accompanied Dampier, and wrote an account of the voyage, saw specimens at Amboyna, and was told that they came to Banda to eat nutmegs, which intoxicated them and made them fall down senseless, when they were killed by ants. Down to 1760, when Linnaeus named the rarest species *Paradisca apoda* (the footless paradise bird), no perfect specimen had been seen in Europe, and absolutely nothing was known about them. And even now, a hundred years later, most books state that they migrate annually to Ternate, Banda, and Amboyna; whereas the fact is that they are in completely unknown in these islands in a wild state as they are in England. Linnaeus was once acquainted with a small species, which he named *Paradisca regia* (the king bird of paradise), and since then nine or ten others have been named, all of which were first described from skins served up by the savages of New Guinea, and generally more or less perfect."

All the members of this family are inhabitants of New Guinea and the adjacent islands, with the exception of three species, which are peculiar to Australia. We are indebted to Mr. Wallace, who spent many years in the Malay Archipelago, for much information respecting the habits and distribution of these birds. "The *Paradisidae*," he says, "are a group of moderate-sized birds, allied in their structure and habits to crows, starlings, and to the Australian honey-suckers, but they are characterized by extraordinary developments of plumage, which are unequalled in any other family of birds. In several species large tufts of delicate bright-coloured feathers spring from each side of the body beneath the wings, forming trains, or fans, or shields; and the middle feathers of the tail are often elongated into wires, twisted into fantastic shapes, or adorned with the most brilliant metallic tints. In another set of species these accessory

plumes spring from the head, the back, or the shoulders; while the intensity of colour and of metallic lustre displayed by their plumage is not to be equalled by any other birds, except perhaps the humming-birds, and is not surpassed even by these."

In the form of the bill, the position of the nostrils, and the presence of a tuft of plumes concealing the latter, the birds of paradise resemble the crows; the sides of the upper mandible are notched towards the tip; the wings are long and rounded at the tip; the tarsus is long and strong, and covered in front by a single long plate, followed by two or three smaller shields, or by three or four large plates of nearly equal size; the toes are well developed and terminated by long, curved claws, the posterior toe being very long, and the inner anterior one shorter than the outer. Their food consists of fruits and insects.

The Great Bird of Paradise (*Paradisca apoda*), says Wallace, "is the largest species known, being generally 17 or 18 inches from the beak to the tip of the tail. The body, wings, and tail are of a rich coffee brown, which deepens on the breast to a blackish-violet, or purple-brown. The whole top of the head and neck is of exceedingly delicate straw yellow, the feathers being short and close set, so as to resemble plush or velvet; the lower part of the throat up to the eye is clothed with scaly feathers of an emerald green colour, and with a rich metallic gloss, and velvet plumes of a still deeper green extend in a band across the forehead and chin as far as the eye, which is bright yellow. The beak is pale lead-blue; and the feet, which are rather large and very strong and well formed, are of a pale ashy-pink. The two middle feathers of the tail have no webs, except a very small one at the base and at the extreme tip, forming wire-like cirrhi, which spread out in an elegant double curve, and vary from 24 to 31 inches long. From each side of the body, beneath the wings, springs a dense tuft of long and delicate plumes, sometimes 2 feet in length, of the most intense golden-orange colour and very glossy, but changing towards the tips into a pale brown. This tuft of plumage can be elevated and spread out at pleasure, so as almost to conceal the body of the bird. These splendid ornaments are entirely confined to the male sex, while the female is really a very plain and ordinary-looking bird of a uniform coffee-brown colour, which never changes, neither does she possess the long tail wires, nor a single yellow or green feather about the head. The young males of the first year exactly resemble the females, so that they can only be distinguished by dissection. The first change is the acquisition of the yellow and green colour on the head and throat, and at the same time the two middle tail feathers grow a few inches longer than the rest, but remain webbed on both sides. At a later period these feathers are replaced by the long bare shafts of the full length, as in the adult bird; but there is still no sign of the magnificent orange side plumes which, later still, complete the attire of the perfect male. To effect these changes there must be at least three successive moultings; and as the birds were found by me in all the stages about the same time, it is probable that they moult only once a year, and that the full plumage is not acquired till the bird is four years old. It was long thought that the fine train of feathers was assumed for a short time only at the breeding season, but my own experience, as well as the observation of birds of an allied species which I brought home with me, and which lived two years in this country, show that the complete plumage is retained during the whole year, except during a short period of moulting, as with most other birds. The Great Bird of Paradise is very active and vigorous, and seems to be in constant motion all day long. It is very abundant, small flocks of females and young males being constantly met with; and though the full-plumaged birds are less plentiful, their loud cries, which are heard daily, show that they also are

very numerous. Their note is 'Wank-wank-wauk—wôk-wôk-wôk,' and is so loud and shrill as to be heard a great distance, and to form the most prominent and characteristic annual sound in the Aru Islands. The mode of nidification is unknown, but the natives told me that the nest was formed of leaves placed on an ant's nest, or on some projecting limb of a very lofty tree, and they believe that it contains only one young bird. The egg is quite unknown, and the natives declared they had never seen it; and a very high reward offered for one by a Dutch official did not meet with success."

When the males are in full plumage they hold what the natives call their dancing parties. About twenty male birds assemble at sunrise on a tree with spreading branches and few leaves: raising their long plumes over the back they keep them in a continual vibration, at the same time flying from branch to branch in great excitement. The native hunters, having discovered the trees frequented by the birds, take up their position, armed with bows and arrows, among the branches, concealing themselves by a covering of palm leaves. In this way they can shoot the birds, one by one, without being seen or heard by them. The birds are merely stunned by the blunt arrows, and falling down are secured by the natives below without any injury to the plumage. The Great Bird of Paradise has only been found in the mainland of the Aru Islands, but Wallace considers it possible that it may inhabit the southern portion of New Guinea.

The Lesser Bird of Paradise (*Paradisæa papuana*) is much smaller than the preceding, though very similar to it in colouring. The upper part of the back and the wing coverts are yellow, and the lateral plumes are shorter in proportion. The female is much handsomer than the female of the Great Bird of Paradise, being entirely white on the under surface of the body. This species is commonly imported into Europe for the purposes of ornament. It has a comparatively wide range, being the common species on the mainland of New Guinea, as well as on the islands of Mysol, Salwatty, Jolie, Biak, and Sook.

The Red Bird of Paradise (*Paradisæa rubra*) has the face, the sides of the neck, and the throat covered with small velvet like black feathers, exhibiting an emerald and golden lustre. The back of the head and neck, the upper part of the back and of the breast are yellow; the shoulders and back are cinnamon red, and the wings, rump, and belly chestnut brown. The plumes of the sides, which are of a closer texture than in the Great Bird of Paradise, are rather longer than the bird itself, and of a most brilliant carmine-red colour: the tail is furnished with two very long filaments, which, held up to a considerable part of their length. The whole length of the bird is about 13 inches. The female is destitute of the lateral plumes and tail filaments, and has the face and throat chestnut colour instead of black. This bird is entirely confined to the island of Waigiu. Wallace gives the following interesting account of the method employed to capture these birds:—"A large climbing Arum bears a red reticulated fruit of which the birds are very fond. The hunters fasten this fruit on a stout forked stick, and provide themselves with a fine but strong cord. They then seek out some tree in the forest on which these birds are accustomed to perch, and climbing up it fasten the stick to a branch and arrange the cord in a noose so ingeniously, that when the bird comes to eat the fruit its legs are caught, and by pulling the end of the cord, which hangs down to the ground, it comes free from the branch and brings down the bird."

The King Bird of Paradise (*Cincinurus regius*) is only about 6½ inches long. It is of a bright-red colour above, and the whole of its plumage is of a velvet-like softness, both to the eye and to the touch. The plumes which clothe the nostrils and the forehead are of a fine orange

colour; at the angle of the eye there is a small black spot; the chin and throat are brilliant yellow, bounded beneath by a transverse brownish streak, below which is a broad band of metallic green; the rest of the lower surface is white. On each side of the body, beneath the wings, there is a broad flat plume of feathers, forming a sort of fan, in which each feather is truncated at the extremity. These feathers are gray, but towards their tips they are traversed by two bands—one white, the other red; and beyond these bands the extremities of the feathers are brilliant emerald green. From the tail, which is reddish brown, spring two long, naked, red filaments, which acquire barbs towards the extremity, where they are rolled up in a spiral form; these filaments are curved in such a manner as somewhat to resemble those in the tail of the lyre-bird. The female is reddish brown above, and reddish yellow finely streaked with brown beneath. The King Bird of Paradise is a native of New Guinea, Mysol, and the Aru Islands.

The Magnificent Bird of Paradise (*Diphyllodes speciosa*) is found only in New Guinea and Mysol. It measures about 8 inches in length, and is distinguished by the presence on each side of the neck of two peculiar tufts of feathers. The uppermost of these tufts consists of small, narrow, yellow feathers, each with a black spot at the tip, which stand out nearly at a right angle from the neck; the lower tuft, which is larger but less prominent, is composed of long detached barbs, springing from short tubes; they are of a straw colour, and truncated at the extremity. The front of the neck and breast are marked with alternate transverse lines of bright green changing to blue, and dark green; the colour of most of the rest of the plumage is brown; the wings are reddish yellow, and the head exhibits a metallic lustre. The tail is furnished with a pair of filaments about a foot in length, which terminate in a fine point, and exhibit brilliant blue and green tints. The female is unknown.

Another species (*Diphyllodes Wilsoni*) has been obtained from Waigiu, to which island it is probably peculiar. "The upper mantle is sulphur yellow, the lower one and the wings pure red, the breast plumes dark green, and the lengthened middle tail feathers much shorter than in the allied species. The most curious difference is, however, that the top of the head is bald, the bare skin being of a rich cobalt blue, crossed by several lines of black velvety feathers."

The Superb Bird of Paradise (*Lophorina atra*) is very rare, being found only in the interior of the northern peninsula of New Guinea. Nothing is known of the habits of this bird, and Wallace was unable to obtain a specimen. The plumage is black, presenting green and purple glosses in different lights; the front of the neck and breast are covered by a sort of breast-plate of imbricated feathers, hanging down in front and terminating in a wide fork. This breast-plate exhibits the most brilliant tints of bronzed green and violet; from the sides of the neck spring numerous plumes, gradually increasing in length, and of a rich violet-black colour, which form a sort of mantle, partly concealing the wings.

The Golden or Six-shafted Bird of Paradise (*Parotia searpennia*) is a native of New Guinea and Waigiu, and is easily distinguished from all other known birds of paradise by the presence of six long filaments springing from the head, three on each side, measuring about 6 inches in length, and bearing at their extremities a few barbs, which form a small flat palette. The colour of these filaments and palettes is black, as is also the rest of the velvet-like plumage, except on the throat and the upper part of the breast, which are covered with scale-like feathers, exhibiting the most brilliant golden, coppery, and green tints. The frontal plumes are erect, and white at the tip, forming a sort of pearly-gray tuft on the front of the head; and the flanks are covered with a dense tuft of rather elongated black decomposed feathers, which conceal the wings. The

female exhibits two ear-like tufts on the head, in the place of the singular filaments of the male.

The Standard Wing (*Senioptera Wallacei*) is a new form of kind of paradise discovered by Wallace in the Island of Batchian. "The general plumage is very sober, being of a pure ashy olive, with a purplish tinge on the back; the crown of the head is beautifully glossed with pale metallic violet, and the feathers of the front extend as much over the beak as in most of the family. The neck and breast are scaled with fine metallic green, and the feathers on the lower part are elongated

as to form a two-pointed gorget, which can be folded beneath the wings, or partially erected and spread out in the same way as the side plumes of most of the birds of paradise. The four long white plumes which give the bird its altogether unique character spring from little tubercles close to the upper edge of the shoulder of the wing; they are narrow, only curved, and equally webbed on both sides of a pure creamy white colour. They are about 6 inches long, equal in the wing, and can be raised at right angles to it, or laid along the body at the pleasure of the bird. The bill is horn colour, the legs yellow, and the iris pale olive. This bird frequents the lower trees of the forests, and like most paradise birds, is in constant motion

flying from branch to branch, clinging to the twigs, and even to the smooth and vertical trunks, almost as easily as a woodpecker. It continually utters a harsh, creaking note, somewhat intermediate between that of *Paradisca apoda* and the more musical cry of *Cuculinarus regius*. The males at short intervals open and flutter their wings, erect the long shoulder feathers, and spread out the elegant green breast shields. The Standard Wing is found in Gilolo as well as in Batchian, and all the specimens from the former island have the green breast shield rather longer, the crown of the head darker violet, and the lower parts of the body rather more strongly scaled with green."

The members of the subfamily Epimachide are characterized by long and slender beaks. One of the most remarkable of these is the Twelve-wired Bird of Paradise (*Sclenoides alba*). This beautiful bird is about 12 inches in length. The back and shoulders are a rich bronze green, the wings and tail violet purple, and the head purplish orange. The feathers of the breast are almost black, but are tinged with green and purple, and the outer edges margined with glittering bands of emerald green. The lower part of the body is yellow. A tuft of

feathers from the sides, and six of the innermost of these plumes on each side have the midrib elongated into slender black wires which bend at right angles, curving backward. "The length of the beak is about 10 inches," says Wallace. "It is found on the island of Salwatty and in the north-western parts of New Guinea, where it frequents flowering trees, especially sago-palms and pandanus, sucking the flowers, round about beneath which its unusually large and powerful feet enable it to cling. Its motions are very rapid. It seldom is more than a few moments on one tree, after which it flies straight off, and with great swiftness, to another."

The Long-tailed Bird of Paradise (*Epimachus magnus*), an inhabitant of the mountains of New Guinea, is between 3 and 4 feet long. "In its dark velvety plumage, glossed with bronze and purple, it resembles the *Sclenoides alba*, but it bears a magnificent tail more than 2 feet long, closed on the upper surface with the most intense pale eucalyptus blue. Its chief ornament, however, consists in the group of broad plumes which spring from the sides of the breast, and which are dilated at the extremity and become with the most vivid metallic blue and green. The bill is long and curved, and the feet black."

The Scale-breasted Bird of Paradise (*Phlorus magnifica*) is a beautiful bird found in New Guinea. Three other species of the genus *Phlorus* are peculiar to Australia, where they are known as Rifle Birds.

The Paradise Bird (*Astrapia nigra*) is also a native of New Guinea. The feathers of the sides and back of the head are elongated and silky, and carried back on the sides of the neck so as to form a sort of double crest; the colour of the head is black, with a brilliant greenish gloss. The back of the neck and the back are of a brilliant golden greenish-bronze colour, exhibiting a wonderful play of tints when viewed in different lights; the feathers of these parts are firm and imbricated, resembling the bright scales of a fish. The front of the neck is also clothed with scale-like feathers, forming a sort of gorget; the centre of this gorget is of the same colour as the back, but it is bordered by a sort of collar of the most brilliant colours—ruby-red, golden-orange, and violet. The remainder of the lower surface is of a deep lustrous-green colour. The wings and tail are violet black, but the feathers of the latter are marked beneath with transverse bands of brown. An allied species (*Paridigalla carunculata*) is mentioned by Wallace. It is very rare, but is believed to inhabit the mountainous interior of New Guinea. The head is adorned with wattles.

("The Malay Archipelago: the Land of the Orang-outang and the Bird of Paradise," by A. R. Wallace, London, 1874.)

BIRD-CHERRY. See CHEAST'S.

BIRD-LICE. See MALLOPHAGA.

BIRD-LIME (*lime* = Anglo-Saxon *lym*, German *leim*, glue), a glutinous vegetable product, obtained principally from the inner bark of the holly, or from the berries of the mistletoe, but also from other plants. It is prepared from the holly bark by bruising, long boiling in water, and fermentation; the mass is again boiled in water, and evaporated to a proper consistence. In different countries various processes are employed. When properly prepared from the holly it is of a greenish colour; its smell resembles that of linseed-oil; its taste is bitter; it is adhesive, tenacious, and may be drawn out into threads. It is placed on branches, twigs, &c., for the purpose of catching small birds.

BIRDS (*Aves*), are warm-blooded oviparous vertebrates, clothed with feathers, and possessing four limbs, of which the anterior pair, called wings, are ordinarily constructed as organs of flight, but in some cases they are rudimentary and in others they are converted into aquatic paddles. Some birds are exclusively terrestrial, as the ostrich; others are arboreal; some are aerial, taking their prey upon the wing; others are aquatic; and the intervening gradations between the groups are numerous.

If we examine the skeleton of a bird, we shall find it admirably constructed with a view to strength combined with lightness. In the adult bird all the larger bones, those of the limbs especially, are hollow, and unfilled with marrow. These hollow bones communicate with the lungs, and are filled with air. Nor is this all; there are various extensive membranous cavities or sacs, some internal, others external, between the skin and the muscles, and between the muscles, which also communicate with the lungs, and of which they may be considered as extensions. By this arrangement the air taken into the lungs may, to a considerable extent, penetrate, as it were, into the very substance of the bird's body—a circumstance of no small importance in reducing its specific gravity, and rendering it capable of being readily supported in the air by the action of the wings. So ready is the communication between these air-sacs and the lungs, that birds have even been known to breathe through a fractured wing-bone when the ordinary air-passages have been closed by compression. The bones forming the skull in birds become completely united together at a very early period of life, so that the whole of the true skull (*cranium*) usually appears to be composed of a single bony piece without any of those sutures which, in the mammalia, mark out the separate bones of which the skull is composed. In the skull the occipital bone (Plate I. fig. 6, J, K, L) has a hole

(ϕ) for the passage of the cerebro-spinal axis. At the lower edge of this hole is the occipital condyle (χ); above are two ridges (μ and ν). In front is the body or basilar part of the sphenoid bone (\jmath , κ , 1, 2), with sides (δ) and apex (ϵ). The orbital plates (η) form a hole (θ) through which the optic nerve passes. The temporal bone (\mathfrak{M} 3); mastoid piece (\mathfrak{M} 1); squamous portion (\mathfrak{M}); parietal bones (\mathfrak{M} , 4); frontal bone (\mathfrak{M} , 5); nasal processes (\mathfrak{M}); superciliary ridges (\mathfrak{M}); posterior orbital process (\mathfrak{M}); anterior orbital process (\mathfrak{M}); orbital plates (\mathfrak{M}). The ethmoid bone (\mathfrak{M} , 6) consists of a vertical plate and a body (\mathfrak{M}) which, with the frontal bone, forms a passage for the olfactory nerves. The ostrich family presents a remarkable peculiarity in the appearance of the ethmoid bone upon the forehead. In all other birds the upper edge of its partition plate is not continued beyond the edge of the nasal gap of the frontal bone; the intermaxillary, therefore, articulates in most instances with the latter bone, by overlapping the middle of this edge, or by a hinge-like connection with both bones, as in the parrot family. But in the ostrich and others of its group the front of the partition plate (fig. 7 A, σ^*) projects before the frontal edge, and, rising to the surface, interposes itself between the nasal bones (\mathfrak{M} , 8) on the sides, and the intermaxillary bone (7) in front, by the latter of which it is partially overlapped, so that in these birds the motions of the upper mandible are performed on this and not on the frontal bone. The intermaxillary bone (\mathfrak{M} , 7), nose bones (\mathfrak{M} , 8), and upper jawbones (\mathfrak{M} , 9) form the mandible. As in reptiles the lower jaw does not articulate directly with the skull, but indirectly by means of the tympanic or quadrate bone (\mathfrak{M} , 3*), which is in front of the ear-drum; its lower end (κ) is connected with the articular surface of the lower jaw. Pterygoid bones (\mathfrak{M} , 2*); palatal bones (\mathfrak{M} , 10); malar bones (\mathfrak{M} , 11); lower jaw (\mathfrak{M} , 13). The jaws are prolonged into a beak of variable form, upon the upper surface of which, near the base, the nostrils are almost invariably situated; the internal partition between these is sometimes deficient, when the nostrils appear to form a narrow horizontal slit or passage, leading from one side of the beak to the other. The jaws bear no teeth, but are covered with horny sheaths, the form of which varies remarkably, according to the nature of the food upon which the bird is destined to subsist. But in the case of certain fossil birds, as *Archaeopteryx*, *Odontopteryx*, and *Ielthyris*, true teeth are found in position in the skull.

The bones forming the BACKBONE of birds are noticed under that heading. The chest provides a large surface for the attachment of the muscles moving the wings, as well as a support upon which these may be moved. The ribs (fig. 6, α , 1) generally consist of seven or eight pairs; the head (α) is attached to a cavity in the body of the corresponding vertebra, the tubercle (b) resting against the transverse process; the tip (c) of the lower extremity is hollowed out. A flat process (d) overlaps the following rib, and thus one cannot move without the participation of all. The true ribs are connected with the breastbone by an equal number of small bones, the "sternal ribs" (e). The two or three pairs of front ribs are not connected with the breastbone, and are called *false ribs* (\mathfrak{N} , 2).

The breastbone (fig. 1, c) is broad and convex externally, and, except in certain birds unfitted for flight, presents a deep central keel (c) for the attachment of the powerful pectoral muscles which set the wings in action. The front angles (α , a) of the keel are long in the domestic fowl and others. The side edges (α , b) are thickened; the hinder edge in diurnal rapacious birds (fig. 1, c , b) is perfect, in which is an aperture (d), though this is wanting in some, e.g. buzzard (fig. 21); in most birds a notch (d) forms a process called the posterior lateral. The depth and size of the holes or notches lessens the solidity of the attachment of the breast muscles, and it is interesting to compare their extent in the various groups. The keel (c)

is wanting in the ostrich (fig. 7, u), which does not use its wings for flight; in the nandou (fig. 16, A, e) there is slight indication of it. Owen observes of the Apteryx (fig. 17, A) that "the *sternum*, the main characteristic of the skeleton of the bird, is reduced to its lowest grade of development in the Apteryx. In its small size, and in the total absence of a keel, it resembles that of the struthious birds, but differs in the presence of two subcircular perforations on each side of the middle line, in the wide anterior emarginations, and in the much greater extent of the two posterior fissures." The bird's power of flight depends in great measure on the size of the crest or keel (e); but hardly less important are the articular cavities (f , f) for the coracoid bones. "These are lengthy grooves parallel to and behind the edge on each side of the front of the crest, and in accordance with their less or greater obliquity to the crest are the coracoid bones, stretched more or less forwards or outwards, in the former case bringing the wing nearer the chest, diminishing the freedom of its motions and the size and action of its depressing muscles, and in the latter the reverse; consequently the more upright the coracoid bones are the less suitable for flight are the wings, as in the common fowl; and the more they incline outwards the more free and powerful are the motions of the wings, as in the swifts, humming-birds, and hawks."

The shoulder-girdle, "scapular or pectoral arch," consists of the blade-bone (fig. 6, r , u), the coracoid bone (r , iii), and the collar-bone or clavicle (r , iv). In the ostrich and its allies the blade and coracoid bones consist of a single undivided piece. In most birds the clavicles are ankylosed together in front, forming the "mercy-thought" or furculum. Its function is "to oppose the forces which tend to press the humeri inwards towards the medial plane during the downward stroke of the wing" (Owen). It is rudimentary in the ostrich group, and is strongest and opens at a greater angle in those birds which are the strongest on the wing.

The upper arm-bone (q , r , v) is called the humerus. Its body (17) is cylindrical; the anterior extremity (18) expands downwards into a large tubercle (19); and on the inside of this there is an opening (19*) for the air to pass into the shaft of the bone; the upper anterior edge expands outwards into a lip (20), to which the breast-muscle is attached, and the fore extremity is enlarged into a tubercle (21). The posterior extremity (22) has two condyles, one above (23) and another below (23*); and between these there are two articular surfaces or pulleys (22, 21). The difference in length of the upper arm-bone in different orders of birds may be readily seen on a reference to the Plate; and also the proportionate length of the upper arm to the fore-arm, upon which depends the power and speed of flight; compare, e.g. the swift (fig. 10) with the ostrich (fig. 7). The fore-arm consists of the ulna (q , vi) and the radius (q , vii). The wrist is made up of two carpal bones (q , $viii$, and ix), and another ankylosed with one of the metacarpals. The metacarpal bone (q , x , x) is "single, although its original composition of three is distinctly perceptible." The analogues of two fingers (q , xi) exist, besides the rudiment of a thumb, which latter carries the "bastard wing."

In the innominate bone (fig. 6, a , ii) all that portion which is above, before, and behind the hip-socket, is the so-called hip-bone (i); the under and back part of the hip-socket stretches back to form the haunch-bone (ii); the share-bone (iii) varies considerably; compare figs. 1, 6, 12.

The leg consists of the thigh or femur (fig. 6, i), leg proper (fig. 6, ii), shank, and foot. The leg proper consists of a tibia ankylosed, with a thin, tapering fibula. The shank bone, tarso-metatarsus (fig. 24, v), combines the several bones (except one) which are found in the instep and sole of reptiles. The ridge of this bone rises up in the stork into a process (fig. 24, 26), which is received, when

the ankle-joint is half-bent, into the cup (fig. 24, 17**) of the shin-bone. In the macaw (fig. 4) the shank-bone is very short, and, as in most climbing birds, has two toes in front and two behind. The cuckoo and owls are able to turn the outer toe either forward or backward; but in the woodpecker (fig. 3) it is always backwards. The penguins have a remarkable shin-bone (fig. 8, 13), short and wide, and resting flat on the ground with the foot, as in most toed reptiles. The toes often give indications of the habits of birds; thus in diurnal birds of prey (fig. 1) they are powerful; in the coot (fig. 25) and allied birds they are long, straight, and slender, as also in the divers (fig. 12); in birds which seek their food by scratching (fig. 6) they are short and stout, and the claw-joints not much curved.

All birds have a covering of FEATHERS. The longest and strongest, and consequently those which have the most influence upon the power of flight possessed by any bird, are the feathers inserted upon the hand; these are called *primaries*. They usually decrease in length from the outer margin of the wing, and in this case the wing is



A, A, Primaries; B, B, Tertiaries; C, C, Lesser coverts; D, D, Greater coverts; E, E, Bastard wing; F, F, Scapulars; G, Upper tail coverts; H, Under tail-coverts; I, Rectrices.

more or less pointed in its outline; in other cases the longest feather is the fourth or fifth, when the apex of the wing becomes more or less rounded. Their number is usually nine or ten, and sometimes eleven. The name of *secondaries* is given to the feathers attached to the middle division of the anterior limb, corresponding with the forearm of man; these are shorter and weaker than the primaries, and vary far more in their number. The *tertiaries* are the feathers attached to the proximal end of the forearm. The feathers covering the humerus and the scapula are known as *scapulars*. A few small quill feathers attached to the rudimentary thumb form what is called the *alula* or "bastard wing," and the bases of all the quills are concealed by numerous large but comparatively soft feathers, forming the *wing-coverts*, which are distinguished as primary and secondary, according to their position.

The quill feathers of the tail, like those of the wings, are long and stiff; they are furnished with muscles, by which they can be spread out to catch the air or contracted within a small compass; and by the motion of the tail itself they may be turned in various directions. Hence, from their serving in one sort as a rudder for the bird in its aerial course, they have been termed *rectrices*; the quills of the wings being also known as *remiges*, from their being the

main instruments of propulsion. The bases of the tail feathers are concealed, like those of the wings, by softer feathers, forming *tail-coverts*; these are usually of moderate or small size, but sometimes attain an extraordinary degree of development.

The muscles in birds are extremely vigorous, and from the rapidity of the circulation, the high oxygenation of the blood, and the extent to which the lungs are carried out, are capable of long-continued exertion. They are generally very firm, and of a deep red colour. The principal mass of the muscles is devoted to the movement of the wings. These, of course, vary in bulk according to the power of flight possessed by the bird, and correspond with the development of the sternal keel. The muscles of the thigh and shank are also largely developed; and it is in the hinder limbs also that we find the sinews presenting most distinctly those peculiarities which characterize them in birds. They are exceedingly white and glistening, and have a great tendency to become ossified. The long tendons which pass down the back of the tarsus from the flexor muscles of the toes are especially remarkable in these respects. They are of the greatest importance to the bird in perching; indeed, it is by this peculiar arrangement that the bird is enabled to perch. Passing over the back of the heel, like a cord a pulley, they are necessarily stretched by the flexion of the joint, caused by the weight of the body in the act of alighting. They thus exercise a sort of involuntary action upon the toes, causing them to grasp any object with great firmness, and thus retaining the bird securely in its position even during sleep.

Birds are either carnivorous, insectivorous, granivorous, or omnivorous; and their digestive apparatus is modified accordingly. The crop, which is a dilated sac, at the termination of the gullet, leads by a canal into a second enlargement, the commencing portion of which is surrounded by a zone of glands pouring out a solvent or gastric fluid. This portion is termed *proventriculus* or *ventriculus succenturiatus*, and in granivorous and many other birds, as ducks and geese, conducts to the gizzard, composed of two voluminous muscles, which surround a cavity lined with a thick tough membrane. These muscles exert a sort of opposite grinding motion, with antagonising pressure, like two millstones; the effect is a reduction of grain or other matter into a pulpy mass; but, in granivorous birds at least, this cannot be effectually done unless a number of pebbles or coarse particles of sand are swallowed, which assist in the trituration of the food. In mollusc-feeding ducks, which swallow shells, the gizzard is enormously powerful, grinding down the rigid substances subjected to its action. In carnivorous birds there is no true gizzard. Some birds, as the pigeon, pour from the crop, while rearing their callow young, a milky glandular secretion to serve as nourishment for their brood. In some birds, as the parrot and pigeon, the gall-bladder is wanting.

The heart in birds consists of two auricles and two ventricles. The lungs are not contained in a chest or pectoral cavity, but are attached to the dorsal portion of the spine, and fill up the hollows between the ribs at their junction with it; they communicate with internal, intermuscular, and subcutaneous air cells and the hollow bones; the enormous bills of the toucan and hornbill are thus made reservoirs of air. In fact, no portion of a bird's structure is impervious to air, not even the barrels of the quill feathers; hence the complete oxidation of the blood.

The brain in birds is proportionally smaller than in the mammalia, and the surface of the cerebral hemispheres is devoid of convolutions, indicating a lower degree of general intelligence. The organs of the senses also are for the most part less perfect than in the mammalia, and the sense of touch especially must generally be possessed by birds in a very low degree. The bill and the naked skin covering the base of the upper part of the bill developed in some birds, and known as

the *cere*, are about the only organs of touch. The eyes, however, are usually of large size and well formed, although, as they have but little power of motion in the orbits, these animals are under the necessity of turning their heads to bring into view any objects at which they desire to look. This peculiarity is induced by the form of the eye, which is of a very large size, and of a more or less flattened form, but bearing in front a narrowed portion, the surface of which is occupied by the cornea. Around this narrowed portion of the eye we find a curious ring of small bony plates imbedded in the sclerotic coat, and hence known as the sclerotic plates. The office of these plates, which are connected with delicate muscular fibres, is to increase or



Sclerotic Plates of the Penguin.

diminish the convexity of the cornea, according as the ring which they form is contracted or dilated by the action of their muscles, and thus adapt the visual power of the eye to the varying distances of objects. In addition to the ordinary upper and lower eyelids, birds possess a third membranous eyelid—the *membrana nictitans*. This third eyelid is placed on the inner side of the eye, and by a special muscular apparatus it can be drawn over the anterior surface of the eye like a curtain, moderating the intensity of the light. Eyelashes are altogether absent.

The vocal sounds for which birds are so remarkable, are formed by an organ which is altogether peculiar to them, and which is situated at the lower extremity of the *trachea*, just at its division into the two bronchial tubes. This organ is the *inferior larynx*. Its structure varies greatly, being extremely complicated in some birds, and in others, as storks, the organ is entirely wanting.

The organs of hearing are, next to those of sight, the most highly developed in birds; but they are never furnished with an external ear, such as we see in most mammalia. The ears open on the sides of the head, behind the eyes; they are usually surrounded by a circle of feathers, which to a certain extent takes the place of an external ear, and within these the tympanic membrane may be easily seen stretched across the bottom of a short passage. In the owls and other nocturnal birds the ears are of great size.

The organs of smell are but imperfect in their construction; the internal cavities possessing but few of those convolutions, clothed with a delicate mucous membrane amply supplied with nerves, which exist in most mammals. The nostrils are nearly always placed on the sides of the bill, or at its base; the only exception to this rule being presented by the singular genus *Apteryx*, which is peculiar to New Zealand. In many birds with the nostrils placed near the base of the bill, these apertures are pierced in a naked skin called the *cere*. The sense of taste appears to be exercised by most birds in even a still lower degree of perfection than that of smell, for the tongue is usually of a horny texture, and it is only in the parrots and a few other birds that we meet with a fleshy tongue. In the humming-birds the tongue forms a tubular sucker, in woodpeckers it is an insect-spear, and in both can be protruded at will to a remarkable extent. In the wry-neck it is an organ of touch, and, being covered with a viscid secretion, is enabled to draw insects into the mouth with great facility.

To enter within moderate limits into the various systems of classification, proposed by naturalists from the time of Belon to the present period, is utterly impossible. The first

solid sketch was effected by Willughby, whose work, a system of ornithology, was edited by the celebrated Ray in 1678, after the author's death. Ray improved upon Willughby's system; Derham carried on the work, and on the labours of these rested in a great measure the system of Linnæus. In 1760 Brisson published his system, and in 1790 appeared that of Latham; and since his time, Temminck, Cuvier, De Blainville, Vigors, Swainson, Blanchard, Isidore Geoffrey St. Hilaire, Owen, Huxley, Garrod, Parker, Sival, and others have published their respective views. The birds are generally grouped in the following orders:—Pici, Volitores, Passeres, Scansores, Psittaci, Accipitres, Columbæ, Gallinæ, Grallæ, Anseres, Struthiones, and Saururæ, under which headings the general characters of each group is given.

A few typical birds are figured in the Plates II.–V. The order Accipitres is represented by the Egyptian vulture (fig. 1, Plate II.). In this order, too, is sometimes placed the curious curiama (fig. 11), a very aberrant form, classed by some naturalists among the Grallæ. Of the Volitores, two birds, the house martin and the grand jacamar (figs. 2 and 3), presenting considerable difference in external appearance, are figured. Of the great order Passeres the long-tailed titmouse (fig. 4) is the representative. It belongs to the division Dendrostromes, or birds with a notched bill. In Plate III. is figured the yellow parakeet (fig. 5), belonging to the order Psittaci, and the magnificent fruit pigeon (fig. 6), belonging to the order Columbæ. The horned tragopan (fig. 7) was the first of the tragopans introduced into England. This group is one of the most remarkable of the Gallinæ or game birds. The great bustard (fig. 8) has within the last fifty years become extinct in England. It is a member of the order Grallæ (wading birds), which is fully represented in the following Plate. The great egret (fig. 9) is an American bird closely allied to our beautiful heron. The common thick-knee or stone curlew (fig. 10), nearly allied to the plovers, is a lover of desert places. Its chief haunts in England are the sandy districts of Norfolk. The order Anseres is represented by the flamingo (fig. 12); the shoveller (fig. 13); the wandering albatross (fig. 14), a large sea-bird with powerful wings—the length of time it can sustain itself sailing over the waves without moving its wings is still *sub judice*; and the goosander (fig. 15), found in the north of Scotland.

Plates showing some of the most remarkable birds in each order will also be found under the respective headings.

Fossil Birds.—Few fossil remains of birds, comparatively, have been discovered; and the reason which Sir C. Lyell gave for this fact, in his "Principles of Geology," is very plausible. "The imbedding of the remains of birds in new strata would be of very rare occurrence, for their powers of flight insure them against perishing by numerous casualties to which quadrupeds are exposed during floods; and if they chance to be drowned, or to die when swimming on the water, it will scarcely ever happen that they will be submerged so as to become preserved in sedimentary deposits."

In the red sandstone of the Triassic period occurring in the valley of the Connecticut River, in America, impressions of footprints, apparently formed by bipeds with three toes on each foot, have been discovered. Though many of these footprints are undoubtedly the tracks of Deinosaurian reptiles, which have been shown by Huxley and others to have possessed the power of walking, at least for a time, on their hind legs, Lyell and other authorities consider that some may be referred to birds. Remains of the *Archæopteryx*, which is now generally considered to be a bird, have been found in the Oolitic slates of Solenhofen, in Bavaria. In the Cretaceous rocks of the United States, Marsh has found remains of birds with teeth. [See *ICHTHYORHINI*, *NEPTORHINI*.] In the rocks of the Tertiary period, fossil birds are comparatively abundant.

Gastornis parisiensis, a bird as big as an ostrich, has been found in the Eocene rocks of France; and *Protornis glarisiensis*, the oldest known bird of the order PASSERES, in Switzerland, in the rocks of the same formation. In England, too, in the Eocene rocks, a small vulture (*Lithornis vulturinus*) and a kingfisher (*Halegornis toliapicus*) have been discovered. In recent years many birds have become extinct, as AUK, DODO, MOA, and SOLITAIRE.

[The reader is referred also to the following articles:—EGG, FEATHERS, MIGRATION, NESTS, SONG.]

BIRD'S-EYE VIEW, a mode of perspective representation in which the objects are drawn as seen from above. Thus, if a hole were bored through the ceiling of a lofty room, a person looking down through it would have a proper bird's-eye view of the apartment and its furniture. But the most common mode of giving a bird's-eye view differs from ordinary perspective only in the horizontal line, and consequently the point of sight, being placed considerably above the objects represented. The scene is thus shown as it would appear from some lofty station, as a tower or other eminence. The rules applicable to either mode of representation depend on the general principles of perspective.

BIRD'S-FOOT. See ORNITHOPTES.

BIRD'S-FOOT TREFOIL. See LOTUS.

BIRD'S NEST. See NEST.

BIRGUS. See TREE CRAB.

BIRKBECK, GEORGE, M.D., was born in 1776 at Settle, in Yorkshire, where his father was a merchant and banker. He displayed an early predilection for mechanical and scientific subjects, which led him to select the medical profession as his pursuit. He took his degree at Edinburgh, where he remained until 1799, when he was elected professor of natural and experimental philosophy at the Andersonian Institution at Glasgow. Some time afterwards he commenced a gratuitous course of lectures to the artisan class, which he continued until 1804, and was succeeded by Dr. UR. He went to London in 1807, where he practised as a physician with much success. He was one of the first to help in the formation of the London Mechanics' Institution, now known as the Birkbeck Institution, Chancery Lane. It was commenced in 1823, and Dr. Birkbeck was elected president, which office he filled up till the time of his death. At its formation he very generously lent the sum of £3700 for the purpose of building a lecture-room, &c. He died 1st December, 1811.

BIRKENHEAD, a town on the Cheshire side of the river Mersey, which has rapidly risen to great importance. It is opposite Liverpool, and the distance from one bank of the river to the other is 1340 yards. Birkenhead owed its origin to the foundation of a Benedictine priory in the reign of Henry II. The prior enjoyed the right of ferry across the river. In 1801 the population was only 110, and in 1821 only 200. In 1861 it was 51,649; in 1871, 65,980; and in 1881, 83,324. The number of voters in 1883 was 9343.

The wonderful increase during the last thirty years is owing to the construction of a large number of very capacious docks, and some extensive shipbuilding yards, especially that of the Messrs. Laird. The docks were first projected in 1827 by the late William Laird, an iron shipbuilder of Liverpool; but the corporation of that town, in 1828, purchased the property on the margin of the then Wallasey Pool, and thus prevented any appropriation of the pool for dock purposes until 1844, when Mr. John Laird, in connection with some other gentlemen, purchased back a large portion of the property, brought forward a plan of docks again, and carried a bill through Parliament against the strongest opposition from the Liverpool corporation and dock authorities, who were afraid that the docks would draw away a portion of the business from their town. After continued disputes and hindrances the docks on both sides of the river were, by an Act of Parliament passed in

1857, placed under the management of one trust, called the Mersey Docks and Harbour Board, and they are now regarded as part of one great system. The Birkenhead docks consist of 180 acres of water-space, including the Great Float of 150 acres, having a minimum depth of 22 feet, a tidal basin of 16 acres, and other docks for the accommodation of the largest class of ships. The entrances to these docks, in one case upwards of 100 feet in width, have 5 or 6 feet more depth than those on the Liverpool side. Extensive warehouse accommodation is provided, and is continually being extended. There are three graving-docks, each from 700 to 750 feet long, and one about 900 feet long. The cost of these constructions has been upwards of £4,000,000, and they form the most extensive and perfect works of the kind in the country. The entrance gates and bridges are opened and the cranes and lifts worked by the most improved hydraulic machinery, and the arrangements of the warehouses are of the most modern and complete description. The trade includes all kinds of heavy goods, but especially coal, grain, timber, guano, and Indian cotton. The commercial statistics are included in those of LIVERPOOL. As the success of the town and its railway mainly depends on that of the docks, great efforts are made to encourage shipping to enter the port. The Dock Commissioners, the Warehouse Company, and the Railway Company, have entered into such mutual arrangements that the dues on laden shipping entering Birkenhead are very little more than nominal.

There are several most extensive manufactories on the margin of the Great Float, and two of the docks at Messrs. Laird's works are capacious enough to take in ships of the largest class. The Birkenhead iron works of Messrs. Laird Brothers, employ from 3000 to 4000 men; these works, in connection with their shipbuilding yards, have turned out some of the largest ironclad vessels. The Britannia and other yards are on a scale of corresponding magnitude. Near the town are several other extensive iron and smelting works, paint factories, &c., and some quarries of excellent stone.

The town of Birkenhead, being all of modern construction, and having also been built on a regular plan, is exceedingly well laid out. The streets are broad, straight, and intersect each other at right angles, room being left for their extension into the country whenever the growth of the town necessitates it. There are at present about 70 miles of streets, nearly all of which are paved and lined with houses. The most noticeable feature in the centre of the town is Hamilton Square, which is 7 acres in extent, and is surrounded with large and handsome houses. The chief public buildings are the general post office, a large and handsome edifice; town-hall; county court; free public library, with accommodation for 300 readers, and a library of 40,000 volumes; workmen's hall, with every convenience, and a large room, used for meetings and concerts, and capable of containing 1000 persons; theatre, and music hall. Birkenhead is well supplied with churches and chapels for all denominations—some of them really handsome edifices.

There are also schools of all kinds. In the north-west of the town, on rising-ground, is a park 190 acres in extent, and very tastefully laid out in lakes and broad lawns, varied with trees and shrubs. Near it is a fine hospital, presented to the town by the late Mr. Laird, M.P., and also a school of art, built by the same gentleman for the benefit of the town in 1872. A statue of Mr. Laird was erected in 1877.

Birkenhead is well supplied with water, and its drainage and other sanitary arrangements have been carried out in the most complete and satisfactory manner. The building for the market, too, is one of the finest in the provinces. The dwellings of the working classes are chiefly large blocks of buildings, let out in flats, as in Scotland.

Birkenhead was made a parliamentary borough in 1861, and returns one member. The borough includes, besides

the chapelry of Birkenhead, the townships of Claughton, Oxtou, Tranmere, and part of Higher Bebington.

Birkenhead has good railway accommodation with all parts of the kingdom by means of the North-western and the Great Western lines. It is 194 miles N.W. of London. The communication with Liverpool is kept up by steamboats, which ply from each side of the river at frequent intervals, and by a tunnel under the Mersey, completed in 1885. [See LIVERPOOL.] Some of the ferry-boats are handsome and commodious saloon steamers, capable of carrying above 1700 passengers each.

BIRKET-EL-KEROUN, the ancient *Maris*, a large lake in the province of Faioum in Middle Egypt, to the west of the great valley of the Nile, from which it is separated by the range of the Libyan Mountains. [See FAIOM.] A canal carries the waters of the Nile at the time of its rise into Faioum, through a gap in the ridge, near Benisouef; and the waters which remain, after the purposes of irrigation are served, discharge themselves into Lake Keroun. The lake is in the form of a crescent, the convex part of which faces the N.W. and it is bounded on that side by a ridge of rocks which separates it from the sandy desert. The length of the lake from one horn of the crescent to the other is about 30 miles, and its greatest breadth in the centre is about 5 miles. Almost all travellers in Egypt have given elaborate descriptions of the lake and its neighbourhood.

BIRKET-EL-MARIOUT, the ancient *Mareotis*, a large lake to the south of Alexandria in Egypt, which once washed the city walls on that side. It communicated by a canal with the Canopic branch of the Nile. It also communicated by another canal with the sea at Port Emoustus, or the old harbour of Alexandria. After the Arab conquest, the canals being neglected, the lake ceased to receive the waters of the Nile; its own waters gradually receded from their banks, and after the lapse of several centuries were entirely dried up. In 1801, during the French invasion of Egypt, the English army, in order to distress the garrison the French had in Alexandria, cut the isthmus which separates the bed of the Mareotis from Lake Mâdîeh or Aboukir, when the sea-water flowed in and again covered the Mareotis to the extent of about 30 miles in length, and 15 in its greatest breadth. The depth of the lake varies from 14 feet in its northern part, near Alexandria, to 4 feet towards its southern extremity.

BIR'MA. See BIRMAIL.

BIRMINGHAM, a municipal and parliamentary borough in the county of Warwick, in 52° 59' N. lat., and 1° 18' W. lon., distant from London 189 miles by road and 112 by railway, and situated on the Roman Ikenild Street. The area of the borough is 8420 acres, of which about one-fourth is land not yet built upon. The population, according to the census of 1881, was 400,000; the number of inhabited houses, 73,000. The poor-law divisions are Birmingham parish, with its own board of guardians; Edgbaston parish, included in the union of Kings Norton; and part of Aston parish, included in the Aston union. The municipal and parliamentary boundaries are identical, and though the suburbs of the town extend into Worcestershire and Staffordshire the borough itself is wholly in Warwickshire. It is built upon the New Red Sandstone formation, and has chiefly a gravelly soil, with occasional patches of mud and clay. The configuration of the ground is remarkably undulated: the lowest parts are 200 feet above sea-level, and the highest parts reach an altitude of 600 feet. The town is consequently one of the highest and also one of the healthiest in England—being placed upon the ridge which constitutes what has been called the backbone of the Midlands. To this elevated situation it owes its immunity from epidemics, as it stands high above the cholera line. The mean death-rate for the last decennial period is about twenty-four in the 1000. The appearance of the town is remarkably picturesque, as viewed from a distance, and this impression

is confirmed on inspection—the streets being usually curved to meet the necessities of the site, and the buildings, especially those in the centre of the place, being handsome and greatly diversified in style. New Street, the principal thoroughfare, is justly esteemed one of the finest in the kingdom.

History.—The first mention of the place occurs in Domesday Book thus:—"Richard holds of William (Fitz Aueulf) four hides in Bermingeham. The abbe en-employs six ploughs; one is in the demesne. There are five villeins and four bordars, with two ploughs. Wood half a mile long and two furlongs broad. It was and is worth 20s." The name of the place at the Conquest is settled by this entry; but in various documents and records there have been reckoned about 100 ways of spelling it. Dugdale, the historian of Warwickshire, assumes the original form to have been Bromwycham, and assigns it to a Saxon derivation; Hutton, the Birmingham historian, indulges in extremely fanciful conjectures, and is inclined to carry back the community to Roman times. The most reasonable conjecture is that the name is Saxon, derived from Beorn, the designation of perhaps the first possessor, "ing" signifying the family or tribe, and "ham" the home or dwelling-place. Thus Birmingham would stand for "the home of the Beorns." That there was a community here previous to the Conquest is shown by the Domesday entry, and further by the fact that in 1309 the then lord, William de Bermingham, gave proof that in Saxon days his ancestors had a market, and levied tolls. Public records, however, are practically silent as to the early history of Birmingham; nor did the town make any great figure on the larger stage of national affairs until comparatively modern days. The most notable incidents are these:—In 1265 William Bermingham led a body of his people to the support of Simon de Montfort at the battle of Evesham, and was killed there, his estates being forfeited for treason. They were restored to his son, and were held by the family until 1527, when Edward de Bermingham was falsely accused of highway robbery by John Dudley, duke of Northumberland, who obtained a grant of Edward's lands. On the fall of Dudley the manor of Birmingham passed to the crown, and was granted in 1555 to Thomas Marrow of Berkswell, from whose family it went in 1746 to Thomas Archer, and ultimately to the family of Musgrave, who still hold the manorial rights, excepting those of fairs and markets, which early in the present century were bought by the town commissioners, and now belong to the corporation. In the civil wars between Charles I. and the Parliament the town was very strongly Parliamentary, in this respect being much influenced by the ministers and others who had taken refuge in the neighbouring ancient city of Coventry. So far was the sympathy of Birmingham carried that the smiths and cutlers of the town refused to supply sword blades to the Royalists, but made as many as 15,000 swords for the Commonwealth troopers. Clarendon speaks of the place as being "so generally wicked that it had risen upon small parties of the king's, and killed or taken them prisoners, and sent them to Coventry, declaring a more peremptory malice to his Majesty than any other place." Just before the battle of Edgehill (23rd October, 1642) Charles lodged for two nights at Aston Hall, close to Birmingham. The townsmen seized part of his baggage, with much plate and money, and sent it off to the Parliamentary garrison at Warwick; and so soon as the king had moved onwards they attacked Aston Hall, and compelled the owner, Sir Thomas Holte (who had a Royalist garrison), to surrender—Sir Thomas being also imprisoned and heavily fined for his loyalty. In April, 1613, the Royalists had their turn. Prince Rupert, passing through Birmingham on his way to Lichfield, took a bitter revenge. He canonaded the town, burned nearly 100 houses, killed and wounded many people, allowed his troops to sack the place, and ended by levying

a heavy fine upon the townsfolk—the total loss to them being reckoned at more than £20,000, equivalent to at least £100,000 at the present value of money. The Royalists, however, did not escape without serious loss, some of their men being killed and injured—among the former being the Earl of Denbigh, one of Prince Rupert's officers. From this period until the Revolution of 1688 Birmingham was quiet; but on the flight of James II. the townspeople distinguished themselves by an attack upon the Roman Catholics, including the destruction of a chapel and convent, for the building of which James had provided part of the materials. With the exception of somewhat serious bread riots in 1754, and again in 1766, there was no remarkable occurrence until 1791, when the famous Church and King riots broke out. This outbreak of popular fury was the result of a long and bitter conflict between Churchmen and Nonconformists, the latter guided chiefly by the Unitarians, who, under the leadership of Dr. Priestley (then minister of the New Meeting), had striven with vigour to shake off the religious and political disabilities affecting them. The polemical warfare, which was carried on for several years, aroused strong feelings of partisanship on both sides, and this was brought to an unprecedented height by the outbreak of the French Revolution, which excited a keen interest amongst the Liberal section of the population. On the 14th of July, 1791, a dinner was to be held at the Royal Hotel to celebrate the destruction of the Bastille. Inflammatory placards denouncing those who proposed to attend the dinner appeared upon the walls, and threats were freely used against them; but they persevered in their intention, and the dinner took place without any disturbance. Scarcely, however, had the company separated when an organized attack was made upon the Unitarians. For that night and for the three following days the town was at the mercy of a drunken and ruffianly mob, composed of the lowest elements of the population, but secretly inspired and directed by persons of higher station, who kept in the background. The watchword of the rioters was "Church and King," and the only chance of escape for suspected or obnoxious persons was to chalk this formula upon their doors. The first attack was aimed at the two Unitarian chapels, both of which were burned. Then Dr. Priestley's house of Fairhill, in the suburb of Sparkbrook, was assailed, sacked, and given to the flames—the whole of his library, philosophical instruments, and manuscripts (embodying the labours of years) perishing in the fire. The houses of Hutton the historian, of Baskerville the famous printer, and of many other leading Unitarians, shared the same fate. The Unitarians were compelled to flee to save their lives; the mob paraded the town, threatening general destruction. At last the authorities recovered courage, or thought that mischief enough had been done; a strong body of troops came to the help of the magistrates, and the riot was put down. But it was not quelled until property to the value of nearly £40,000 had been destroyed, or until many of the rioters themselves had perished—some of them dying drunk, in the cellars of the burning houses. Some of the ruffians were captured and tried at the next assizes at Warwick; four of them were hanged, and the rest sentenced to imprisonment. The loss of the sufferers was partly made good at the cost of the hundred, but not without much haggling; and in the end little more than half of the value of the property was recovered. One result of the outbreak was that it drove Dr. Priestley not only from Birmingham, but from England, and induced him to emigrate to the United States. A tardy honour was done to his memory seventy years later by the erection of a statue of him in front of the Town-hall. As if ashamed of these excesses, Birmingham has since distinguished itself by the vivacity and consistency of its Liberalism. From 1817 to 1829 various movements were conducted for the purpose of promoting religious and political freedom, and in the

last-named year the Political Union was formed, under the leadership of Mr. Thomas Attwood, to assist in carrying the first Reform Bill. Meetings 100,000 strong were held on Newhall Hill; there was talk of marching upon London, proposals were made to refuse payment of taxes, and many violent counsels were offered. But the Union was essentially a peaceful organization; the leaders firmly controlled the fiercer spirits, and in the end they were rewarded by achieving success by the moral force of their demonstrations. The Reform Bill passed; the great towns, till then excluded, received parliamentary representation, and the country agreed that the triumph of reform was largely due to the influence of Birmingham. Only on two occasions in later years has the peace of the town been disturbed, though intense political activity has been the rule of the place. The Chartist agitation gave rise to one of these occurrences, several houses in the Bull Ring having been burned by Chartist rioters on the 15th of July, 1839. Again in 1867 (16th June), owing to the fury excited against the Roman Catholics by an ultra-Protestant lecturer named Murphy, one or two streets, inhabited chiefly by Irish, was sacked, and much alarm was created; but the disturbance was quickly put down.

Government and Parliamentary Representation.—Birmingham had no regular municipal government until 1769. Up to that period its local affairs were administered by three sets of officials—(1) the justices, to keep the peace and to punish crime; (2) the court leet and its officers, to look to the regulation of markets, nuisances, and other matters belonging to the lord of the manor, or interfering with his rights; (3) the church-wardens, who transacted the church and parish business, and held vestry meetings for town purposes generally. In 1769, owing to the growth of the place and the necessity of a better system, an Act of Parliament was obtained appointing a body of commissioners for the purpose of lighting, cleansing, and improving the town; and this body (which filled vacancies in its number by self-election) continued in existence until 1851. The people, however, were not satisfied with it, and consequently, upon the passing of the Municipal Corporations Act in 1835, an application was made for a charter of incorporation as a municipal borough. In 1838 a charter was granted, the governing body being constituted of sixteen aldermen and forty-eight councillors. The street commissioners still continued to exercise jurisdiction in the parish of Birmingham, and several other bodies of the same self-elected kind had control of other parts of the district included in the borough. In 1851 an Act of Parliament was passed abolishing all these governing bodies, and transferring their powers to the Town Council, whose authority was further extended by another private Act passed in 1862. At the time the charter of incorporation was granted, the town also received a grant of a separate commission of the peace, and a grant of quarter sessions for the trial of prisoners. In 1839 a police force was instituted, but in consequence of the Chartist riots this was at first placed under the control of a government commissioner, and it was not until 1842 that it passed into the hands of the corporation. The present strength of the police force is 520 men. In 1875 the corporation, by purchase, authorized by special Acts of Parliament, acquired the property of the gas and water companies which had previously supplied the town. The cost of the gas-works was about £1,500,000, and of the water-works about £1,300,000. Large sums have since been expended in improving both undertakings. The water supply is derived from streams in the neighbourhood of the town, from deep wells sunk in the sandstone, and from storage reservoirs, one of which (90 acres in extent) is capable of holding 600,000,000 gallons, equivalent to nearly six weeks' supply in case of the failure of all other sources. The water thus obtained is of good quality and of moderate hardness. The gas-works yield a revenue of £25,000 a year to the

corporation, after paying the cost of interest on the purchase money and providing a sinking fund for the extinction of the capital outlay. The water-works also yield a profit, which is expended in reducing the cost of water and improving the supply. The income of the corporation (exclusive of the sum paid by the gas-works, the yield of the market tolls, and some other minor receipts) is derived chiefly from rates levied on the town, the corporation having no landed property. The rates levied for municipal purposes amount to about 8s. 8d. in the pound, on an assessment of ratable property of £1,500,000. In addition to these a school-board rate of 7½d. in the pound was levied, and also a poor rate, which varies in amount in the several parishes in the borough. In the parish of Birmingham, which has the highest poor rate, the total local rates would amount to a little more than 6s. in the pound; in the other two parishes the total would be a little over 5s. The total expenditure of the corporation for municipal purposes averages about £320,000. The debt of the borough, including the cost of the gas and water works, is £5,600,000. This amount includes the debt incurred on account of an improvement scheme undertaken in 1876 under the provisions of the Artisans' Dwellings Act, and by which a sanitary and street improvement of great magnitude and value has been effected. The amount borrowed for this scheme is about £1,500,000, which is covered by property of equivalent value acquired by the corporation.

Until the Reform Act of 1832 the parliamentary representation of Birmingham was included in that of the county of Warwick. By that Act two members were assigned to the town; and by the Reform Act of 1867 the number was increased to three, which was further increased to seven by the Redistribution Act of 1885. With one exception the representation of Birmingham has always been in the hands of the Liberals, the exception being from July, 1844, to August, 1847, during which period one seat was filled by Mr. Richard Spooner, a Conservative. The town has been singularly constant to its parliamentary representatives. In the fifty years since members were first allotted to it the representation has been held by only nine persons, no change having been made excepting by death or resignation. The following is a complete list of the members for the borough from 1832, in the order of their election, until the end of 1884:—Thomas Attwood sat five years; Joshua Scholfield, twelve years; R. Spooner, three years; G. F. Muntz, seventeen years; William Scholfield, fifteen years; John Bright, twenty-seven years; G. Dixon, nine years; P. H. Muntz, sixteen years; Joseph Chamberlain, eight years.

Education.—Elementary education is provided by board schools and schools connected with religious bodies, chiefly the Church of England and the Roman Catholic. The School Board (consisting of fifteen members) was elected in 1870, and has already provided twenty-seven schools, capable of receiving on an average 1000 children each. The cost of sites and building amounts to a total of nearly £400,000; the school rate averages about 7½d. in the pound. The denominational schools number fifty-seven, with accommodation for 30,000 children—the total provided for by the two classes of schools being thus close upon 60,000; the average attendance is at present about 55,000. In addition to the ordinary teachers the School Board has a special science instructor, and much attention is given to teaching cookery and household economy to girls. Secondary education is provided by the great series of schools on the foundation of King Edward VI. The endowments of the trust consist of the rents of lands formerly belonging to the Guild of the Holy Cross, a semi-religious and semicharitable foundation dating from the middle of the fourteenth century. These lands were confiscated by Henry VIII. at the suppression of the monasteries, but, on petition of the inhabitants, were regranted

by Edward VI. (in 1552) for the provision of a grammar-school. The property was then valued at £31 2s. 10d. (about £300 yearly, according to the present value of money). The rentals now yield about £23,000 a year, and by fees received from a section of the scholars this is raised to £27,000 a year, with a prospect of considerable increase. The grammar-school was originally managed by a self-elected body of governors; but by a *scow* scheme, prepared by the Charity Commissioners in 1878, the governors were fixed at twenty-five in number, of whom eight are chosen by the Town Council, one by the school teachers, and one each by the Universities of Oxford, Cambridge, and London. The elected governors sit for six years from the date of election; the co-optative governors hold their offices for life. At the time mentioned, and by subsequent statutes, the constitution of the foundation has been much altered. The instruction was formerly free, and the scholars were admitted by the governors' nomination. All scholars are now admitted only by competitive examination, and only a certain proportion are received free, the remainder paying fees. The free scholarships are open (by competition) to scholars in the elementary schools of the town. There were formerly several elementary schools in connection with the foundation; these are now abolished, and the group of schools is now constituted as follows:—(1) a high school for boys; (2) a high school for girls—these are in New Street, in the centre of the town; (3) five middle schools in various parts of the town, three of them having departments for girls as well as boys, and all of them devoted to secondary education, and providing, in the total, for nearly 2500 pupils. There are numerous scholarships in connection with the foundation, tenable at Oxford, Cambridge, and London; and there are others tenable at Mason College, Birmingham. Mason Science College, which provides for higher education (on the plan of the Owens College, Manchester, and similar institutions), was opened in 1880. It is situated in Edmund Street, near the Town-hall. This college was founded by the late Sir Josiah Mason, who realized large wealth by penmaking and electro-plating, and who built it at a cost of £60,000, and endowed it with properties valued at over £100,000. It is governed by eleven trustees, five of whom are chosen by the Town Council, and the others are co-optative—the whole being appointed for life. The scheme of the college includes advanced instruction in all branches of science, languages, and literature, and provision is made for the inclusion of medical instruction and teaching in art. There are twelve professors—of chemistry and metallurgy, physics, physiology, biology, botany, geology and mining, mathematics, engineering, Latin and Greek, English language and literature, German, and French; and there are also several demonstrators and assistants. About 300 students attend the day classes, and some of the professors also conduct evening classes. The college possesses a valuable library of about 12,000 volumes; biological and geological museums; three lecture theatres; and admirably appointed laboratories and classrooms, modelled upon the best German examples. The building, which is singularly fine in character, is of brick and stone: architect, Mr. J. A. Cossins, Birmingham. Queen's College (Paradise Street), founded in 1828 and incorporated in 1867, had formerly an almost university character, under royal charter, and was empowered to grant degrees in engineering; but it is now confined to two departments—one medical, in connection with the General and Queen's Hospitals, and the other theological (Church of England). For their science teaching the students attend Mason College. The Birmingham and Midland Institute, a specially important educational institution, was founded in 1854, under authority of an Act of Parliament. The foundation stone of the original building, which cost £15,000 (architect, Mr. E. M. Barry), was laid by the late

Prince Consort, 22nd November, 1854. The building has now been largely extended, at a cost of £30,000 (architects, Messrs. Martin and Chamberlain, Birmingham), and includes one of the finest lecture halls in England. The institute is divided into two departments—one general, including weekly lectures, reading-rooms, &c.; the other industrial, with evening classes in science, literature, &c., for artisan and other students, in connection with the Government Department of Science and Art. There are also morning classes for ladies, and subsidiary classes are held at some of the board schools. There are at present over 4000 students in the various classes; and there are about 2000 annual subscribers, by whose contributions and the class fees the institution is maintained, there being no endowment. A public subscription, amounting to more than £20,000, has just been raised towards paying for the new buildings. The list of presidents of the institute includes the names of many eminent men, such as Dickens, Kingsley, Huxley, Tyndall, the late Dean Stanley, Professor Max Müller, &c. Part of the institute buildings are occupied by the School of Art, which has a large number of students. At present it is governed by a committee of subscribers, but it is about to be transferred to the corporation, a site worth £15,000 for a new building having been given by a local landowner, and two donations of £10,000 each being also given for the building itself. It will be seen from this recital that Birmingham is well provided with the means of elementary, secondary, and advanced education. There are also several colleges for special purposes in or near the town. The Congregationalists (Independents) have one for the training of ministers at Spring Hill, Moseley; the Wesleyans have one for the same purpose at Handsworth; there is a training college for schoolmasters (for the dioceses of Worcester, Lichfield, and Hereford) at Saltley; and the Roman Catholics have an extensive school in connection with the Oratory at Edgbaston, under the general direction of Cardinal Newman, and a college at Oscott.

Closely associated with the educational institutions are the public and other libraries of the town. The chief of these is the Free Reference Library belonging to the corporation, and supported by the library rate. This was destroyed by fire, 11th January, 1879, together with the whole of its contents, including the famous Shakspeare library. It is now, however, restored on a much larger scale than formerly, the new buildings, both as to extent and ornamentation, being unsurpassed in the provinces. The architects are Messrs. Martin and Chamberlain, and the cost of the new library is about £50,000. The restored collection of books at present amounts to more than 50,000 volumes, many of them of great value; and the new Shakspeare library (including a complete set of the folios and several of the quartos) is making great progress; the committee have been aided in the general work of restoration by numerous valuable gifts of books, and by a subscription of £15,000 raised by the townspeople. The principal room of the new reference library measures 100 feet by 64. In the same building is a lending library, containing nearly 30,000 volumes, and a free news-room of the same size as the reference library. There are also four branch lending libraries and news-rooms in various parts of the town. The next largest library (open to subscribers only) is called the Birmingham Library, in Union Street. It was established in 1780 by Dr. Priestley, and now contains over 50,000 volumes. The Mason College (already mentioned) has a fine library of scientific books; and the Medical Institute, Edmund Street, established as a meeting-place for members of the medical profession, has also a large collection of professional works. In connection with the corporation libraries is a temporary (free) gallery of art, containing a fine collection of the works of David Cox, and many other pictures of merit, and also a variety of

examples of industrial art. A large building is now being erected for the art gallery, as part of the council house. Other means of art instruction and recreation are afforded by the classes and exhibitions of the Royal Society of Artists, which receives students in painting, &c., provides for art lectures by a staff of professors, and holds two exhibitions annually—one of water colours in the spring, and one of oil pictures in the autumn. Associated with these exhibitions is an art union licensed by the Board of Trade. There are also in the town various societies of an educational character, such as the Archaeological Society, a branch of the Institute; and the Natural History Society, the Philosophical Society, and the Historical Society, which meet at Mason's College, besides many minor associations of a scientific or literary character, and numerous musical societies, some of which afford the means of training to their members.

Religion.—Birmingham is a rural deanery, in the archdeaconry of Coventry, diocese of Worcester. In the borough there are fifty-nine churches and licensed rooms belonging to the Church of England. The principal church is St. Martin's, the parish church, and until 1715 the only one. The original building was erected about the middle of the thirteenth century, but owing to its dilapidated state this was wholly removed in 1878, and a new church (fourteenth century Gothic) built at a cost of £30,000 (architect, Mr. J. A. Chatwin, Birmingham). The next important church is St. Philip's (Italian), built in 1715 by Archer, a pupil of Wren. Another church of note is St. Alban's, built in 1880 (architect, Mr. Pearson). The rest of the churches of Birmingham are not remarkable for architectural qualities; nor can the Nonconformist edifices make any particular boast, though of late years more attention has been paid by them to the artistic enrichment of their places of worship. Birmingham is very strong in its Nonconformist character. As far back as the Commonwealth it was marked in this respect, and in 1662 it gave refuge to several of the ministers ejected from neighbouring places under the Act of Uniformity. These ministers conducted their services at the Old Meeting, where a Presbyterian congregation was gathered, but the Old Meeting afterwards passed into the hands of the Unitarians. The chapel itself was removed in 1882, to make way for the enlargement of the Central Railway Station; but a new one, to perpetuate its name, is about to be erected. Another Unitarian chapel of note was the New Meeting, in Moor Street, of which Dr. Priestley was the minister; in 1862 this place was sold to the Roman Catholics, and the Unitarian congregation migrated to a new Gothic building in Broad Street. They have four other chapels in Birmingham, and the members of the sect have for several generations taken a leading part in the public affairs of the town—many of the wealthiest and most prominent citizens still belonging to it. Another influential body is the Society of Friends, who have one meeting-house here, and who conduct extensive Sunday Schools in Severn Street, with about 3000 scholars (almost all of them adults) in the various classes. The Friends' Meeting was first opened in 1690, and the members of the Society have ever since occupied a most influential position in the town. The Independents (or Congregationalists) have nine chapels in the borough; the chief of them is that in Carr's Lane, for many years under the pastorate of the Rev. J. Angell James, and now under that of his immediate successor, Mr. R. W. Dale. The Wesleyans, planted in Birmingham in 1745 by John Wesley himself, have seventeen chapels, and the other branches of the Methodist denomination bring up their total to forty. The first Baptist chapel was built in 1738; there are now fourteen places of worship of this denomination. The Presbyterians have three churches, the Jews have a synagogue, and there are nine places of worship which must be classed as miscellaneous. The Roman

Catholics make Birmingham the centre of a diocese, and have two bishops here, one of them a coadjutor. They have altogether ten churches and chapels, and several conventual establishments. Their principal church is the Cathedral of St. Chad, in Bath Street, which, with the bishop's house opposite to it, was built from the designs of the late Mr. A. Welby Pugin, and was one of the earliest examples of his revival of Gothic art. Birmingham is closely identified with the restoration of the Roman Catholic hierarchy in England, Dr. Ullathorne, the bishop resident here, having been much consulted on the subject by the then pope, and Dr. Wiseman, the first archbishop, having been long stationed in Birmingham. Peculiar distinction is conferred upon the Roman Catholics of the town by the residence of Cardinal Newman, who came here soon after his withdrawal from the Anglican Church, and has resided here ever since that period. Religious societies—charitable, reformatory, and educational—are numerous in the town, and the religious spirit is distinctly marked amongst a large section of the population. To the credit of Birmingham, it should be said that differences of creed are almost invariably held in abeyance when any public work, other than theological or ecclesiastical, has to be done, members of all denominations associating freely and combining heartily in the government of the town, and in the administration of institutions and charities.

Charities.—The charitable institutions of Birmingham are numerous and important. The medical charities consist of twelve hospitals and a sanatorium. The principal of these is the General Hospital (Summer Lane), begun in 1765 and opened in 1779, which affords relief to about 3000 in-patients and nearly 30,000 out-patients annually, and expends about £13,000 a year. In connection with this hospital the triennial musical festivals were commenced in 1768, when Handel's "Messiah" was performed in St. Philip's Church. The second festival took place in 1771, and then came an interval until 1784, when the regular succession of triennial music meetings began. Until 1834 the festivals were held in St. Philip's Church for sacred music, and in the theatre for secular performances. In 1834 they were wholly transferred to the new Town-hall, where they have ever since been conducted. These meetings have been marked by the first production of many works of the highest importance; Mendelssohn's "Elijah," for example, was produced here in 1846, and Gounod's "Redemption" distinguished the festival of 1882. All the great vocalists and instrumentalists available from the outset of the festivals have appeared at them, and no cost or labour have been spared by the management to maintain the high character of the meetings. The fine organ in the Town-hall, built by Messrs. Hill of London, is the property of the General Hospital Committee. Patients are admitted to the hospital free as regards accidents or urgent cases, and by subscribers' recommendation as regards other cases. The Queen's Hospital (wholly free) was opened in 1840, in connection with the medical school of Queen's College, from which it is now separated. It receives about 1200 in-patients and about 15,000 out-patients annually. This building is remarkable for the completeness of the out-patient department, which has one of the largest reception-halls in the country. The other hospitals are the Children's (free), the Eye Hospital, the Ear and Throat Infirmary, the Orthopedic, the Hospital for Women's Diseases, the Skin and Lock Hospital, a homœopathic hospital, a dental hospital, a lying-in charity, and a borough hospital for cases of infectious disease. There is also a general dispensary, the officers of which visit patients at their own homes. The Sanatorium is at Blackwell, on the slopes of the Lickey Hills. There are also training institutes for nurses, and several minor charities, connected in various ways with the work of the hospitals. All these charities are mainly supported by

subscriptions and donations, few of them (excepting the General Hospital) having endowments or accumulated funds of any considerable amount. An important portion of their income is derived from the Sunday hospital collections and the hospital Saturday collections. The former, begun in 1859, is a collection made on one Sunday in October in the churches and chapels. The produce of one year is given to the General Hospital, of the next to the Queen's Hospital, and that of the third is divided (in proportion to the work done by them) amongst the other medical charities. This collection has yielded about £113,000 since its commencement. The Saturday hospital collection is made in the manufactories and workshops, usually in March, and is conducted by a committee on which workmen are largely represented. Its produce is divided amongst all the medical charities, according to the amount of their work. The total yield since its establishment in 1873 has been about £37,000. Other charities, not medical, include a deaf and dumb school for boys and girls, and an institute for the blind, both at Edgbaston; a great series of almshouses for aged women, directed by the trustees of Lench's Trust; similar almshouses for ladies, the Evans' Homes, at Selly, near Birmingham; and the William Dudley Trust, consisting of the income of £100,000 bequeathed by Mr. William Dudley, formerly a jeweller in Birmingham, the produce of which gives annuities to decayed tradesmen, loans to young men starting in business, and annual donations to some one or more of the charities of the town. The great charitable institution of the town is Sir Josiah Mason's charity at Erdington. This consists of almshouses for thirty women, a servants' home for girls who have been trained in the Orphanage, and of an Orphanage for 300 girls, 150 boys, and 50 infants. The Orphanage building was completed in 1869, at a cost of £60,000, defrayed entirely by Sir Josiah Mason, in addition to which he endowed the charity with estates valued at £200,000. The government of the institution is directed by fourteen trustees, half of them appointed by the founder, and the rest elected by the Town Council of Birmingham. Another charity of interest is the Reformatory School at Salfley, the first established under the Act of 1854. It receives about eighty boys. There are numerous other charities, of which details must be sought in the local handbooks; and besides these the town is amply supplied with friendly and sick societies, partly connected with national organizations, but largely conducted in association with the various manufactories.

Manufactures.—The manufactures of Birmingham are almost infinite in their variety, and are marvellous in their ingenuity, whether as regards handicraft skill, the employment of scientific processes, or the application of machinery to the task of production. Birmingham is essentially a metal-working town. Other manufactures have been tried—the first cotton-spinning mill, for example, was erected here by John Wynt and Lewis Paul in 1730—but they have never taken root, and the place has now for generations settled down steadily to metal working. Leland and Camden described its iron-work in the sixteenth century; in the seventeenth century travellers found Birmingham steel-work dispersed over the Continent; in the eighteenth century Burke spoke of the town as "the toy-shop of Europe." But since Burke's time the industries of Birmingham have developed enormously, until there is no conceivable use of metal, from the most precious kinds downwards, which is not represented in the thousands of factories and workshops scattered throughout the town. The earliest manufactures were smiths' work of all descriptions, including cutlery (a trade which has now migrated almost wholly to Sheffield). Then came the making of arms—in the first instance swords, of which, so far back as the civil wars, the Birmingham cutlers furnished many thousands to the Parliamentary troops. Then towards the close of the

seventeenth century gunmaking, both military and sporting, was introduced, and Birmingham became the home of the gun trade. This business grew so rapidly that between 1804 and 1815 the vast number of 1,743,382 fire arms (guns, carbines, and pistols) were supplied to the government. Again, between the end of 1854 and the beginning of 1857, the Birmingham gunmakers produced over 1,000,000 stand of arms for the British and other governments. These were the flourishing days of the military arms trade, and two large factories, each capable of turning out 2000 stand of arms weekly, and furnished with the most perfect automatic gunmaking machinery, were set up to meet the demand. Owing, however, to the development of the government factory at Enfield, to the establishment of factories by foreign governments, and to the competition of the United States and Belgium, the military arms trade in Birmingham has practically died out. Scarcely an order has now (1883) been received for three or four years; one of the great arms-making companies is in liquidation, and the factory of the other is standing idle. But though the military trade is gone, Birmingham still keeps the sporting gun trade and the manufacture of cheap fire-arms for exportation to Africa. The extent of this trade may be inferred from the fact that nearly 500,000 gun and pistol barrels are proved yearly at the proof-house—all guns being required to pass this test before they can be legally sold. Brass and copper working is another trade of great extent in Birmingham, giving employment to 10,000 or 12,000 persons, and consuming (at a rough estimate) over £2,000,000 worth of metal annually. The trade is divided into several branches—the chief of them being cabinet brass-founding, including all kinds of house-fittings, chandelier making, bedstead making, ecclesiastical brass work (which is almost wholly produced in Birmingham), wire-drawing, tubemaking, ships' sheathing, plumbers' and naval brass founding, ornamental work in cast, wrought, and pierced brass-founding, known by its French name of *cuvette poli*. Iron-working of various descriptions also gives employment to a large number of persons in the production of grates, gas and other stoves, engines of various kinds, bedsteads, which are made by the million, and constitute a great export trade, tinmed goods, enamelled iron goods (known as hollow-ware), &c. Cut nails are made by machinery in enormous quantities; machine-made screws for carpenters' use are largely produced—Birmingham having a practical monopoly of this trade; pins are also made by wonderful automatic machinery; and steel pens (first produced by Gillett & Mason in 1830) are now made at the extraordinary rate of about 20,000,000 weekly, and as low in price as 1½d. per gross. Jewelry is one of the staple trades of the town; the productions vary from the highest class of art-work in gold and gems down to the very cheapest stamped gilt jewelry. The trade employs about 8000 persons, and consumes probably £1,000,000 worth of the precious metals annually. Closely connected with this branch is the electro-plated trade, due to the patents of Messrs. Elkington, taken out from 1838 to 1842, and now constituting one of the largest branches of industry, in the production of works of fine and ornamental art and of domestic use. Button-making of all kinds—cloth, silk, wood, metal, and pearl—is still an important trade, though German competition has interfered seriously with it. Papier maché making, in trays, furniture, work-boxes, panels for decoration, &c., is extensively practised in Birmingham; and the town is also noted for the excellence of its manufacture of the best kinds of table glass (the common pressed kinds are not made here), and for its ecclesiastical stained-glass work. Amongst the other trades which may be reckoned amongst leading branches of industry are coinage, die-sinking, wire and other rope making, nickel and copper refining, whip-making, saddlery and harness-making, rule-making, weighing machine and scale making, edge tools

(excluding ordinary table cutlery), sewing machine making, and bicycle-making. Indeed it is impossible to mention any form of metal-working, or any combination of metal with other materials, that is not practised in Birmingham. In former days there were few large factories, most of the work being done by small masters or by "out-workers"—that is, men employed at their own homes; but this condition is fast passing away, owing to the growing use of machinery, which involves a heavy expenditure of capital. Consequently the town is now able to show factories as vast as any in the kingdom, employing from 300 to nearly 3000 workpeople in single establishments; but the system of small manufacturers still exists to a very large extent, and much of the best work is done by them. The workmen, as a rule, earn high wages—higher in the average than those of any other industrial community; they live invariably in separate houses, many of them (through building societies) being the owners of their dwellings; and generally speaking they are remarkable for intelligence and good conduct. Strikes are very rare in Birmingham, the comparatively few trades' unions which exist here being able to adjust disputed questions by friendly arrangement between masters and men.

Birmingham is the centre of a great railway and canal system—the London and North-western, the Midland, and the Great Western connecting the town with all parts of the country. The two first-named companies unite in the Central Station in New Street—a vast building at present covered with a single-span roof, 1100 feet long, 212 feet wide, and 80 feet high. This station is now (1883) in process of enlargement, at a cost of over £250,000, and its area will be more than doubled, the new station absorbing several streets in its neighbourhood, and necessitating extensive alterations in the middle of the town. It is now approached by long tunnels, north and south, through which more than 500 trains pass in the course of the day of twenty-four hours. The Great Western Railway has its own station in Snow Hill; and all three companies have separate stations in the outskirts of the town for goods traffic. The canal system, begun so far back as 1767, was greatly extended by Telford and others down to 1820, and now gives facilities for the carriage of heavy goods, coal, &c., to and from all the principal districts of the kingdom. Much of the traffic, however, has been transferred to the railways, and several of the canals have passed into their hands; but the canal system still remains an important factor in the prosperity of the town.

Public Buildings.—In addition to the Mason College, the Midland Institute, and the free libraries already mentioned, the chief public buildings are the following:—The Town-hall, built in 1831, classic design, of the Corinthian order. The material is gray Anglesey marble, left unpolished. The chief exterior feature is a range of columns going round the building, resting on an arched plinth, and supporting a boldly-designed pediment. The extreme (exterior) length is 166 feet; breadth, 104; height, 83. The principal room (capable of seating 3000 persons) is 140 feet long and 65 feet in breadth and height; architects, Messrs. Hanson & Welsh (Mr. Hanson was the inventor of the "Hanson" cab). The Council-house (near the Town-hall) provides accommodation for the municipal offices; the council chamber is a very noble room, and there are extensive suites of reception-rooms for use in municipal entertainments. The principal front (to Colmore Row) is 296 feet long; the height to the central pediment, 90 feet; and the total height to the top of the dome, 162 feet. The other fronts are (Congreve Street) 122 feet and (Eden Place) 153 feet. The architect is Mr. Yeoville Thomason, Birmingham. The building is now (1883) being completed by the erection, on the Edmund Street front, of offices for the corporation gas department, with a lofty clock-tower at the Congreve Street angle. Above these offices provision is

made for a free art gallery, which will have about 300 feet of length. The cost of the whole building, when finished and fitted, will probably reach over £300,000, exclusive of the site. The General Post-office, Paradise Street, a plain building, with a sorting-room 100 feet by 45 feet; in the public hall of the post-office is a marble statue of the late Sir Rowland Hill (sculptor, Mr. P. Hollins). The Market Hall, High Street, opened in 1835, cost nearly £70,000; dimensions—length, 365 feet; breadth, 108 feet; height, 60 feet. It contains 600 stalls for vendors of fruit, flowers, vegetables, meat, fish, &c. The Exchange has a frontage of 63 feet to New Street, and of 180 feet to Stephenson Place; the ground floor is let in shops, and the upper floors for offices. The great room used for the Exchange is 80 feet long by 70 wide, and 23 high. The building also contains a large assembly-room, used for concerts, &c., a restaurant, and the offices and meeting-room of the Chamber of Commerce. The design is Gothic, the principal fabric being a central tower 100 feet high. The Exchange was opened in January, 1865; architect, Mr. E. Hohnes. The Great Western Arcade, constructed in 1875 (architect, Mr. W. H. Ward), is 400 feet long and 40 feet high, rising in the central dome to 75 feet. It contains forty-two shops on the ground floor and the same number in the galleries. Another arcade, of still larger dimensions, is about to be constructed; and a third, much smaller, leads from Corporation Street to Cannon Street. The Public Office, Moor Street, is the seat of the magistrates' sessions, and the quarter-sessions are held here. It has four court-rooms, two of which are daily used. The gaol, erected by the borough authorities, but now transferred to the government, is at Winson Green; it is capable of receiving 500 prisoners on the separate system. The lunatic asylum is also at Winson Green; another asylum for chronic cases has been erected at Rubery on the Lickey Hills. The workhouse at Birmingham Heath is capable of containing nearly 2000 inmates; separate schools, arranged as cottage homes (about thirty children in each), are provided at Marston Green for the pauper children.

Recreation and Amusements.—Means of open-air recreation are afforded by numerous parks and gardens belonging to the corporation. These are—Aston Park, 49 acres, in the centre of which stands Aston Hall, built by Sir Thomas Holte, in the reign of James I. The park and hall were acquired by the corporation in 1858, and were opened by the queen on the 15th of June in that year. Adderley Park, 10 acres, given by Sir C. Adderley (now Lord Norton), with a building used as a free library; Calthorpe Park, 31 acres, given by Lord Calthorpe, a large landowner in Edgbaston; Cannon Hill Park, 57 acres, and Small Heath Park, 42 acres, both given by Miss Ryland, of Barford, Warwickshire, a representative of an old Birmingham family; Burbury Street Gardens, 4 acres, given by Mr. W. Middlemore; Highgate Park, 9 acres, and Summerfield Park, 12 acres, both bought by the corporation; Park Street Gardens, 4 acres, and St. Mary's Gardens, 3 acres, both of them churchyards transferred to the corporation by a local Act of Parliament, and laid out as pleasure-grounds. The Borough Cemetery at Witton, 105 acres, is also open for public use. Numerous plots of ground, at street corners and other open spaces, are arranged as public gardens, and trees are planted along many of the streets and roads, seats and drinking fountains being placed at intervals. The corporation has four sets of baths, each having large swimming-baths, in different parts of the town. At Edgbaston there is a subscription Botanic Garden, of 16 acres, with large ranges of glass-houses; and at Aston there are extensive pleasure gardens (open on payment) adjoining Aston Park, and known as the "Lower Grounds." These are largely used for flower shows, football and cricket matches, &c., and they also contain a large and handsome theatre. In the borough there are two theatres, the Royal

and the Prince of Wales; a third is in course of erection. There are also three large music-halls and several smaller ones. Musical societies are numerous, some of them having 200 to 300 members, all trained vocalists or instrumental performers, from whom the band and chorus of the triennial festivals are largely derived. So much is music practised in Birmingham that no week passes during the season without one or more concerts. Cheap concerts of a high order are given each Saturday in the Town-hall, by a musical association formed for that purpose.

Miscellaneous.—The daily newspapers are, *The Daily Post* (Liberal) and *The Daily Gazette* (Conservative), both of which are morning papers; and there are also one or two evening papers. There are two weekly papers, *Weekly Post* (Saturday), Liberal, and *Herald* (Thursday), neutral. Two "satirical" papers are also published weekly, and one monthly. There are two monthly magazines, one in connection with Mason College, and one with the Institute; and one quarterly, issued by the Central Literary Association. The Archaeological section of the Institute, the Historical Society, and the Philosophical Society also publish their "Transactions." There are eleven banks in Birmingham; and six principal clubs, two Liberal, two Conservative, and two non-political; besides numerous minor clubs, both social and political. There are twenty-seven masonic lodges in the town. The public statues are numerous; they commemorate Nelson (Westmacott), Peel (Hollins), Priestley (Williamson), Thomas Attwood (Thomas), James Watt (Munro), George Dawson (Woolner), Joseph Sturge (Thomas), Sir Rowland Hill (Hollins), the late Prince Consort (Foley), and her Majesty the Queen (Woolner). The town also possesses Foley's original models of the statues of Goldsmith and Burke, cast by Messrs. Elkington for erection at Dublin. At the rear of the Town-hall there is a handsome memorial fountain, with portrait medallion, erected to commemorate the municipal services of Mr. Joseph Chamberlain; and in the hall is a fine bust of Mendelssohn by Hollins, placed there in commemoration of the production of the "Elijah" in 1846. The government offices and buildings in Birmingham are the County Court, the Probate Registry for Warwickshire, the Inland Revenue Office, the small-arms proof-house of the war department, the assay office for gold and silver plate, the post office, the gaol, and barracks for cavalry. There is also a volunteer rifle corps (the 1st Warwickshire), 1200 strong, which has its special armoury and drill-hall. Cattle and dog shows are held annually, the former in Bingley Hall, which covers an area of $1\frac{1}{4}$ acre, and the latter in Carzon Hall, the main exhibition room of which is 103 feet by 91 feet.

BIR'NAM, a hill in the east of Perthshire, Scotland, 1580 feet high, on the south side of the town of Dunkeld. It was formerly part of a royal forest. One of the opposite hills to the S.E. is Dunsinane, with some remains of the usurper Macbeth's castle. Both Birnam Wood and Dunsinane are immortalized in Shakespeare's tragedy of "Macbeth,"

"Fear not till Birnam
Come to Dunsinane."

BIRTHS, REGISTRATION OF. By the Births and Deaths Registration Act, 37 & 38 Vict. c. 88, it is required that in the case of every child born alive it is the duty of the father and mother, or where these are unable to fulfil the duty, of the occupier of the house, and of each person present at the birth, and the person having charge of the child, to give notice to the registrar of the district within forty-two days. If required by the registrar the day of the birth, the name (if any has been given) of the child, the name, surname, and profession of the father (except where the child is illegitimate), and the name and maiden surname of the mother must also be given, and the register signed by the person giving the information. Where a child is illegitimately born the registrar must not

enter in the register the name of any person as father of the child, unless at the joint request of the mother and of the person who acknowledges the paternity. In such case both persons must sign the register.

No fee or reward can be lawfully demanded by the registrar, unless he is required to attend at the residence of the informant, or the house where the birth took place, when he is authorized to demand a fee of one shilling. After the expiration of twelve months a birth cannot be registered except with the written authority of the registrar-general. If, within twelve months after the name of a child has been registered, a different or additional name be given to it in baptism, the parent, guardian, or other person may present a certificate signed by the minister who baptized the child, and by payment of a fee of one shilling, may have the name properly altered in the register, and certified to the registrar-general.

The law of Scotland on this subject is similar to that of England, with an additional provision that where a child is registered as being illegitimately born, and the parents subsequently marry, the entry must be corrected in the margin by a note recording such marriage.

BIRTHWORT. See *ARISTOLOCHACEÆ*.

BIS' CAY, BAY OF. is that portion of the Atlantic Ocean which washes the northern coast of Spain, and divides it from the western coast of France. Its opening, which is directed to the N.N.E., measured between the two extreme points, Cape Ortegal and the Isle of Ouessant, is about 400 miles wide. From the opening the bay gradually becomes narrower, the coast of France trending to the S.E., while that of Spain continues nearly in a due eastern direction. A line drawn from St. Jean de Luz, situated at the western extremity of the Pyrenees, to the middle of the opening of the gulf, would measure about 300 miles, which is the length of the gulf. The shores which inclose this bay vary greatly in character. Beginning with Cape Ortegal, and continuing along the whole northern coast of Spain, they are rocky and elevated, sometimes rising to several hundred feet, and cut by numerous short inlets, which in several places form excellent harbours. This rocky coast extends upwards of 300 miles. The shores of France present a different aspect. From the Bidassoa to the Gironde, upwards of 150 miles, they are sandy and low, lined by an uninterrupted series of sandy dunes, by which numerous lakes are separated from the sea. There is not a single harbour on all this coast except those formed by the embouchures of the rivers Adour and Gironde. To the N. of the Gironde the shore continues to be low and marshy, but at no great distance from the beach a fine undulating country commences. This kind of coast continues as far as the Bay of Morbihan and the Peninsula of Quiberon, about 200 miles. The remainder of the French coast along the Bay of Biscay, about 120 miles in length, is moderately high, being rocky only in a few places. In this part there are several good harbours.

No islands or rocks occur along the coast of Spain, nor along that of France S. of the Gironde. But to the N. of this river, at no great distance from the shore, are the isles of Oléron, Ré, Noirmoutier, and Botin, all of which are rather low and marshy. The rocky island of D'Yeu lies further from the shore. West of the Bay of Quiberon the islands are smaller but more numerous, and the rocks frequent. The most considerable islands are Belle Isle and the rocky and almost inaccessible Ouessant.

The rivers which run into the Bay of Biscay on the coast of Spain have a short course, so that here the basin of the bay extends only a short distance inland. But it is otherwise in France. Here the basin of the bay comprises more than half the surface of France, including the basin of the Loire, which extends 200 miles inland, and those of the Garonne, the Adour, the Charente, the Sèvre Niortaise, the Vilaine, and the Blavet.

The commerce carried on in the harbours of the Bay of

Biscay is considerable. Spain, however, furnishes only a small portion of the exports, owing to the difficulty of transporting heavy commodities to the coast from the interior. From the inland provinces only wool is brought to the ports of Santander and Bilbao; the produce of the coast itself is not considerable, and consists chiefly of fruits. But more than half the products of the soil of France, and nearly the same portion of its manufactures, are exported from the harbours of Bayonne, Bordeaux, Rochelle, and Nantes; and large quantities of foreign merchandise are received by the same ports.

The navigation of this part of the ocean would be easy and safe, on account of the great width of the bay and the absence of rocks and shoals, if its waters during strong western and north-western winds were not extremely agitated, and formed into high, short, and broken waves. On this account it is nearly as much feared by navigators as the Cape of Good Hope. This effect is mainly produced by the peculiar form of the bay, but is probably sometimes increased by the current which runs along the whole of its shores. This current originates near Cape Ortegal, and runs along the northern shores of Spain and western shores of France, to the point where the Bay of Biscay and the British Channel join. Shooting across the mouth of the latter, it skirts and sometimes incloses the Scilly Islands. It then bends further W., and approaches the coast of Ireland, between Cape Carnsore and Cape Clear, whence it runs to the S.W. and S., till it joins the North African current. This current is hardly perceptible after a long interval of moderate winds; but after hard and continual gales from the west it is felt in considerable strength at the Scilly Islands and the southern coast of Ireland, and causes on both points great loss of life and property, when vessels have been carried out of their way by it and thick weather prevents their setting themselves right by an observation.

BIS'CEGLIA, a seaport town of Southern Italy, in the province of Bari, on a rocky promontory on the Adriatic, 12 miles E.S.E. of Barletta and 13 miles S.E. of Trani. Population, 22,000. A railway connects Bisceglia with the Gulf of Taranto on the one hand, and with Ancona and the central and north Italian lines on the other. The town is surrounded by lofty stone walls, and is ill built. It is the seat of a bishopric, has a cathedral, two collegiate and some other churches, a public school, a hospital, and a fine theatre. Its port admits only small vessels, and it has little trade. It has numerous reservoirs and cisterns cut in the solid rock, and arched over, for the collection and preservation of the rain-water, the place being entirely destitute of springs. It is supposed by some to be the *Natiolum* of the Peutingerian tables, but other critics contend that its ancient name was *Vigilia*.

BIS'CUIT, a kind of bread usually made in the form of flat cakes, and pierced with holes, to insure the complete evaporation of moisture in the baking, which is necessary for preserving it during long voyages. Biscuits are used on land as a kind of luxury, but at sea they are an article of the first necessity, since bread, in the more ordinary form in which it is used on shore, would speedily become mouldy and unfit for food. The name biscuit (twice baked) is evidently derived from the nature of the processes to which this kind of bread was formerly subjected. The two bakings then used are no longer found necessary, but the name, although thus rendered inappropriate, has been continued. The same name is applied, inappropriately also, to several articles made by confectioners, such as sponge biscuits, Naples biscuits, &c., which are sweetened with sugar, and are not reduced by baking to the state of dryness which is a necessary quality of biscuits in their ordinary form. Biscuits for use as ship-bread are usually made of the meal of wheat, from which only the coarsest bran has been separated. The processes of mixing, kneading, stamping, and baking by hand were brought to an almost

machine-like degree of rapidity and regularity in the great biscuit manufactories established by government for supplying the British navy; but of late years they have been still further perfected and facilitated by the introduction of machinery, by which the dough is thoroughly mixed and rolled out into sheets about 2 yards long and 1 wide, which are stamped at one stroke into about sixty hexagonal biscuits of about six to the pound, in such a manner as to leave the sheet sufficiently coherent to be put into the oven as one piece, though when baked the biscuits are easily separated. During the last few years great improvements have been made in their manufacture. The hexagonal shape has been substituted for the circular, because it effects a saving of time and material, and of space in packing.

BISCUIT, in pottery, is a term applied to articles which have been only once baked or burned, and have not yet received the glaze or vitreous coat with which most articles of porcelain or earthenware are covered. The name appears to be given owing to the resemblance of such wares, in colour and texture, to ship-bread. Biscuit-ware is permeable to water, which, however, it imbibes without undergoing any alteration of texture; and owing to this quality it is used for vessels in which fluids are cooled by evaporation from the outer surface.

BISHAREEN is the common name of several tribes which inhabit the mountain desert between the valley of the Nile and the Red Sea. The tribes comprised under this name are masters of the desert lying between the Wady Naby (about 21° N. lat.) to the mouth of the Atbara or Tuerazze; but they are also found to the N. of Wady Naby, where they are mixed with the Abalhe tribes, to whom the country N. of Wady Naby is considered to belong. To the S. some of the Bishareen tribes are met with as far as Massowa (16° N. lat.) on the Red Sea, and here they are mixed with their southern neighbours, the Hadendoa. In their manner of life they are Bedouins, though evidently not of Arabian origin. In winter they pasture their camels and sheep on the mountains near the Red Sea; but in summer, when the grass is dried up in the desert, they descend to the Nile to feed their cattle on the herbage along the banks of the streams.

BISHNUPUR (*Bishenpore*), the ancient capital of Bankura district, Bengal, under its native rajahs—now a municipality, and the most populous town in the district—is situated a few miles south of the Dhulkisor River. Bishnupur is one of the principal seats of commerce in the Bankura district. The chief exports are rice, oil-seeds, lac, cotton and silk cloth, and silk cocoons; the imports, English pieces-goods, salt, tobacco, spices, cocoa-nuts, and pulses. The town contains a large weaving population, and is noted for the manufacture of cotton and silk cloths of fine quality. Besides the usual public offices, there are several schools, a number of Hindu temples, and some Mohammedan mosques. Ancient Bishnupur, if we may put any trust in the native chroniclers, was a magnificent city, “more beautiful than the beautiful houses of Indra in heaven.” It was fortified by a connected line of curtains and bastions, 7 miles in length, with small circular ravelins covering many of the curtains. The citadel lies within the fortifications, and here was situated the palace of the rajahs. The population in 1863 was 18,000.

BISHOP, the name of that superior order of pastors or ministers in the Christian Church who exercise superintendence over the ordinary pastors within a certain district, called their see or diocese, and to whom also belongs the performance of ordination, consecration (or dedication to religious purposes) of persons or places, and finally excommunication.

The word *bishop* is corrupted Greek. *Episcopus* became *episcopos* when the Latins adopted it. They introduced it among the Saxons, with whom, by losing something both at the beginning and the end, it became *piscop*, or as

written in Anglo-Saxon characters, *Bircop*. Other modern languages retain the Greek term slightly modified, as the Italian *vescovo*, Spanish *obispo*, and French *évêque*, as well as the German *bischof*, Dutch *bischoep*, and Swedish *biskop*.

The word *episcopus* literally signifies “an inspector or superintendent,” and a bishop is an overseer, overlooker, superintendent in the Christian Church. As a title it certainly dates from apostolic times, but there are different theories as to the functions of the office in the primitive church. According to the episcopal theory maintained by the Anglican, Greek, and Roman Catholic Churches, the bishops are the direct spiritual successors of the apostles, and have been from the earliest times an order distinct and superior in authority to the presbytery. It is asserted that the first bishops were appointed to their office, and to the district where it was to be maintained, by the apostles themselves, and that the spiritual power and authority has been handed down in unbroken line ever since. The bishops alone have the power of ordination in the church, and their office is absolutely necessary to its continuance.

By the advocates of the opposing theory—the Presbyterianism—it is declared that no trace of any such order is to be found either in the New Testament or in the history of the earliest period of the church. According to this view there was at first no distinction between presbyter and bishop, the terms being used synonymously, both titles being applied to the same persons; they are never at this period used together as if they were applied to distinct orders, and that bishops and deacons are referred to in the New Testament as though they included all the officers of the church. There has been very much controversy between the advocates of these different theories, with the result that each side regards its case as fully proved, but is quite unable to convince the other.

Most of the reformed churches of the Continent have ceased to maintain an episcopal order, and the presbyterian theory is upheld in Great Britain not only by the churches taking that name, but also by most of the independent churches. The episcopal theory is very strongly held in the Eastern and Roman Churches, as it is also by the Church of England; but while the validity of the orders in the other churches is admitted by the Church of England, the validity of her own is denied at least by the Roman Catholic Church.

The episcopalian theory is not so much a question of names as that there have ever been three distinct orders in the Christian Church. Although the names *Episcopus* and *Presbyteros* were to some extent used synonymously, and signified the same office, this was at a period when the apostolic office was in full vigour. There were then—1, apostles; 2, bishops or presbyters; 3, deacons. As the apostles passed away, however, those elders who succeeded to the administrative and other functions which had been exercised by the apostles, but which were not personal to them, came to be specially called *episcopoi*, as being overseers of elders and deacons as well as of the faithful generally. Thus we find Titus appointed by St. Paul, not as an elder of a congregation, but to ordain elders in every city.

It would be foreign to the purpose of this work to defend either view of the subject, and the arguments are too elaborate and numerous on both sides of the question to be detailed here. It may be mentioned, however, that while in the controversies of the past the words of the New Testament, the writings of the fathers, and the influence of Judaism have all been carefully considered, the equally important influence of paganism upon the early church is only now receiving the attention it deserves.

A very valuable contribution to the history of this part of the subject is to be found in the Bampton Lectures for 1880, on “Early Christian Organization,” by Edwin Hatch, M.A. In his introduction he remarks:—“With probably no single exception, the names of Christian institutions and

Christian officers are shared by them in common with institutions outside Christianity. These resemblances have always been admitted, and have to some extent long been investigated. But evidence which has not been thoroughly investigated until recent years, and evidence which has only within recent years come to light—especially in the unimpeachable form of inscriptions—has shown that the resemblances are not merely general but minute." In conformity with this guiding principle, the questions, What in its origin was the Christian society? and What were the primitive conceptions attaching to the offices of bishop, presbyter, and deacon? are answered by Mr. Hatch partly from Christian and Jewish sources, but largely from such evidence as remains to us concerning the organization of other societies or corporations existing side by side with the Christian societies in the Roman world. The body of officers in a Christian community corresponded to the committee of an association, or to the senate of a municipality. Many of the Christian names are the same as those commonly used in these two parallel societies. The officers of a Christian community, of a municipality, and of an association were known collectively by the common name of *ordo*; individually as well as collectively all alike were called *presbuteroi*, and "it is a legitimate inference from the mass of existing evidence"—an inference accepted by writers of almost every theological school—that they were also all called *episcopoi*. The name *episcopoi* had, generally speaking, special reference to financial or administrative functions. The committee of a municipal senate engaged in administering funds for a particular purpose became for the time being *episcopoi*, and in numerous instances the word is found applied to the financial offices of an association or a temple. The *episcopoi* of a Christian community were probably originally the receivers and administrators of church funds. They were in the beginning members of the presbytery or council of elders—the name *presbuteros* is in the earliest Christian times interchangeable with that of *episcopos*, as has been often pointed out. The result to which these considerations lead Mr. Hatch is to support the contention of the Presbyterians that the special dignity and authority assigned to the order of bishops is the growth of later times.

Turning now to the consideration of the present time, it may be observed that the functions of a bishop are in all countries nearly the same. In the Church of England they are—1, confirmation, which is done in the presence of a bishop, who may be understood in this ceremony to recognize or receive into the Christian Church the persons born within his diocese; 2, ordination, or the appointment of persons deemed by him properly qualified to the office of deacon in the church, and afterwards of presbyter or priest; 3, consecration of presbyters when they are appointed to the office of bishop; 4, dedication or consecration of edifices erected for the performance of Christian services, or of ground set apart for religious purposes, as especially for the burial of the dead; 5, institution or collation to vacant churches in his diocese; 6, superintendence of the conduct of the several pastors in his diocese in respect of morals, of residence, and of the performance of the public services of the church; and 7, excommunication, and in the case of ministers deprivation and degradation. These are the most material of the functions which have been retained by Christian bishops. In England they are also the medium of communication between the sovereign and people in respect of all affairs connected with religion, and are an important constituent in the House of Lords.

Whatever kind of assembly or council for the advice of the king there was in the earliest times of the English kingdom, the bishops were chief persons in it. The charters of the early Norman kings usually run in the form that they are granted by the assent and advice of the bishops as well as others; and when the ancient great council became the modern Parliament the bishops were seated in the Upper

House. It is argued that they sit as barons [see *BARON*], but the writ of summons runs to them as bishops of such a place, without any reference to the temporal baronies held by them. In the Parliament of 1642 a bill was passed for removing the bishops from their seats, but at the Restoration this Act was repealed or declared invalid, and the English bishops have ever since had seats in the House of Lords.

For the execution of many of the duties belonging to their high function they have officers, as chancellors and other officials, who hold courts in the bishop's name.

The election of bishops in the earliest times was vested in the people who constituted the Christian Church in the city to which they were called; afterwards, when the number of Christians was greatly increased, and there were numerous assistant presbyters, in the presbyters and some of the laity conjointly. But after a time the presbyters only seem to have exercised the right, and the bishop was elected by them assembled in chapter. The nomination of such an important functionary was, however, an object of great importance to the temporal princes, and they at length virtually obtained the nomination. In England there is still the shadow of an election by the chapters in the cathedrals. When a bishop dies the event is certified to the king by the chapter. The king writes to the chapter that they proceed to elect a successor; this letter is called the *congé d'élire*. The king, however, transmits to them at the same time the name of some person whom he expects them to elect. If within a short time they do not elect, the king may nominate by his own authority; if they elect any other than the person named in the king's writ they incur the penalties of a premunire, which includes forfeiture of goods, outlawry, and other evils. The bishop thus elected is confirmed under a royal commission, when he takes the oaths of allegiance, supremacy, canonical obedience, and against simony. He is next installed, and finally consecrated, which is performed by the archbishop or some other bishop named in a commission for the purpose, assisted by two other bishops. No person can be elected a bishop who is under thirty years of age.

In this country, and generally throughout Europe, an archbishop has his own diocese, in which he exercises ordinary episcopal functions, and also a superiority and a certain jurisdiction over the bishops in his province, who are sometimes called his suffragans, together with some peculiar privileges. The word or syllable *arch* is the Greek element *αρχ*, and denotes precedence or authority. *Patriarch* is a compound of the same class, denoting the chief father, and is used in ecclesiastical nomenclature to denote a bishop who has authority not only over other bishops, but over all the bishops of divers kingdoms or states; it is analogous in signification to the word *pope* (*papa*), a bishop who has this extended superintendence.

The word *archiepiskopos*, or archbishop, does not occur till about or after the fourth century. Other terms by which an archbishop is sometimes designated are *primate* and *metropolitan*. The first of these is formed from the Latin word *primus*, "the first," and denotes simple precedence, the first among the bishops. The latter is a Latin word (*metropolitanus*) formed from the Greek, which, rendered literally into English, would be *the man of the metropolis or mother-city*—that is, the bishop who resides in that city which contains the chief church of all the other churches within the province or district in which he is the metropolitan. The Greek word is *metropolitēs*.

Under the later empire the name metropolis was applied to various cities of Asia, and conferred on them as a title of rank. The Emperors Theodosius and Valentinian conferred on Berytus in Phœnicia the name and rank of a metropolis, "for many and sufficient reasons" ("Cod." xi. tit. 22, 21). Accordingly the bishop of a metropolis was called metropolitan (Gr. *metropolitēs*), and the bishop of a city which was under a metropolis was simply called bishop.

All the bishops, both metropolitan and others, were subject to the archbishop and patriarch of Constantinople, who received his instructions in ecclesiastical matters from the emperor ("Cod.," i. tit. 8, s. 42, 43).

The amount of superintendence and control exercised by the Archbishops of York and Canterbury over the bishops in their respective provinces does not seem to be very accurately defined. If any bishop introduces irregularities into his diocese, or is guilty of scandalous immoralities, the archbishop of the province may, as it seems, inquire, call to account, and punish. In disputes between a diocesan and his clergy an appeal lies to the archbishop of the province in all cases except disputes respecting curates' stipends (1 and 2 Vict. c. 106). The archbishop could of old appoint a coadjutor to one of his suffragans who was infirm or incapable; and this power was confirmed by 6 & 7 Vict. c. 62, entitled "An Act to provide for the Performance of the Episcopal Functions in case of the Incapacity of any Bishop or Archbishop."

The archbishop also nominates to the benefices or dignities which are at the disposal of the bishops in his province, if not filled up within six months from the time of the avoidance. During the vacancy of a see he is the guardian of the spiritualities.

The archbishop has certain honorary distinctions; he has in his style the phrase "by divine providence," but the bishop's style runs "by divine permission;" and while the bishop is only installed, the archbishop is said to be enthroned. The title of "Grace" and "Most Reverend Father in God" is used in speaking and writing to archbishops, and bishops have the title of "Lord" and "Right Reverend Father in God."

The archbishops may nominate eight clerks each to be their chaplains, and bishops six. The Archbishop of Canterbury claims the right of placing the crown upon the head of the king at his coronation; and the Archbishop of York claims to perform the same office for the queen consort, and he is her perpetual chaplain. The Archbishop of Canterbury is the chief medium of communication between the clergy and the king, and is consulted by the king's ministers in all affairs touching the ecclesiastical part of the constitution. The two archbishops have precedence of all temporal peers, except those of the blood-royal, and except that the lord chancellor has place between the two archbishops.

After the archbishops, the Bishops of London, Durham, and Winchester have respectively precedence, and then the bishops of both provinces, according to their seniority of consecration, or translation to an English see from that of Sodor and Man, which ranks lowest.

St. Andrews is to Scotland what Canterbury is to England; and while the Episcopal form and order of the Church existed in that country it was the seat of the archbishop, though till 1470, when the pope granted him the title of archbishop, he was known only as the *Episcopus Maximus Scoticus*. In 1491 the Bishop of Glasgow obtained the title of archbishop, and had three bishops placed as suffragans under him. Until about 1466 the Archbishop of York claimed metropolitan jurisdiction over the bishops in Scotland.

In connection with the Protestant Episcopal Church in Ireland there are still two archbishoprics and ten bishoprics, as no alterations were made by the Representative Church Body, incorporated in 1870, after the disestablishment of the church.

The Roman Catholic hierarchy in Ireland consists of four archbishops and twenty-four bishops.

England and Wales were, soon after the Reformation, divided by the Roman Catholic Church into "districts," over each of which a bishop was placed. But in 1850, in consequence of a rescript issued by the pope, a complete hierarchy was directed to be formed in Great Britain. This created considerable agitation; and in August, 1851,

the Ecclesiastical Titles Assumption Bill (14 & 15 Vict. c. 60) was passed, by which all briefs or rescripts of the pope conferring any such jurisdiction or title were declared void; any person publishing such bull or rescript, or acting upon it, or assuming the title of archbishop or bishop of any city or place within the United Kingdom, was rendered liable to a penalty of £100, to be recovered in a court of law, but only with the consent of or by the attorney-general in England or Ireland, and the lord advocate in Scotland. There was never any conviction under this Act, and the titles were almost universally ascribed to the Roman Catholic dignitaries by members of their own and other communions. In fact the Act, which had been passed hastily in a period of somewhat unreasonable panic, had become so complete a dead letter that in 1871 it was repealed. There are now one Roman Catholic archbishop and fourteen bishops in England and Wales, and two archbishops and four bishops in Scotland.

In the British colonies the first bishopric created was that of Nova Scotia, in 1787, since which they have been appointed by the crown in most of the principal settlements. In 1811 a bishop of the United Church of England and Ireland was appointed for Jerusalem. The right of appointment is alternately enjoyed by the crowns of Prussia and England; but the Archbishop of Canterbury has a veto on the Prussian appointment. The Act 5 Vict. c. 6, was passed to enable the Archbishops of Canterbury and York, and such bishops as they might select, to consecrate a foreign bishop.

In the Episcopal Church of the United States of North America the superior powers of church government are vested in a General or National Convention, which meets triennially. The Convention consists of two Houses. The bishops sit as a body in their own right, and form a separate House. The Lower House is composed of lay and clerical delegates. Each diocese is represented by four laymen and four of the clergy, who are elected by local diocesan conventions. The lay members of the diocesan conventions are elected by their respective congregations or vestries. The General Convention, amongst other things, has the power of revising old or making new canons. It hears and determines charges against bishops; receives and examines testimonials from diocesan conventions recommending new bishops, and decides upon their appointment; without the certificate of the General Convention a bishop cannot be consecrated. The sittings of a General Convention usually last about three weeks.

The bishops of the Methodist Episcopal Church of the United States have no particular province or district.

Bishops in Partibus.—This is an elliptical phrase, and is to be supplied with the word *Infidelium*. These are bishops who have no actual see, but who are considered as if they had, under the fiction that they are bishops in succession to those who were the actual bishops in cities where Christianity once flourished. When a Christian missionary is to be sent forth in the character of a bishop into a country imperfectly Christianized, and where the converts are not brought into any regular church order, the pope does not consecrate the missionary as the bishop of that country in which his services are required, but as the bishop of one of the extinct sees, who is supposed to have left his diocese and to be travelling in those parts. So, when England had broken off from the Roman Catholic Church, and yet continued its own unbroken series of bishops in the recognized English sees, it was, for Roman Catholic ecclesiastical affairs, divided into "districts," over each of which a bishop was placed, who was a *bishop in partibus*.

Suffragan Bishops.—In England every bishop is, in certain views of his character and position, regarded as a suffragan of the archbishop in whose province he is; for in early times the title was given to all provincial bishops who gave their suffrages in the synod summoned by their

metropolitan. But the suffragan bishop is rather to be understood as a *bishop in partibus*, who was admitted by the English bishops before the Reformation to assist them in the performance of the duties of their office. When a bishop filled some high office of state the assistance of a suffragan was almost essential, and was probably usually conceded by the pope, to whom such matters belonged, when asked for. By the Act of 26 Henry VIII. c. 14, the title of suffragan bishops was conferred upon a class of persons who were styled *chorepiscopi* or country bishops, in the ancient church. The preamble of this Act recites that (in the Reformation) "good laws had been made for electing and consecrating archbishops and bishops, but no provision had been made for suffragans which had been accustomed here for the more speedy administration of the sacraments and other devout things," &c.; therefore it was enacted that the places following should be the sees of bishops suffragan: viz. Bedford, Berwick, Bridgewater, Bristol, Cambridge, Colchester, Dover, St. Germain's, Guildford, Gloucester, Grantham, Hull, Huntingdon, Isle of Wight, Ipswich, Leicester, Marlborough, Moulton, Nottingham, Penrith, Shaftesbury, Southampton, Shrewsbury, Taunton, and Thetford. This Act was repealed by 1 & 2 Mary, c. 8, and was revived by 1 Elizabeth, and during her reign there was a suffragan (to the Archbishop of Canterbury) at Dover and elsewhere. The last of the suffragans of this period was Dr. Sterne of Colchester. From his time the law fell into desuetude, but was never repealed, and in 1870 two suffragans were appointed—one, called the Bishop of Dover, for the Archbishop of Canterbury, and the other, called the Bishop of Nottingham, for the Bishop of Lincoln. These were the first appointments of the kind in England for nearly 300 years.

BISH'OP, a beverage made by pouring red wine (claret, burgundy, &c.), either hot or cold, on ripe bitter oranges, and which is afterwards sugared and spiced to taste. In preparing the oranges the white part between the rind and the pulp is removed and thrown away. When white wine is used in this way the compound is termed *cardinal*, and when Tokay is used it is called *poppe*.

BISH'OP, SIR HENRY ROWLEY, one of the most popular of English musical composers, was born in 1786 in London. When only eighteen he produced sets of musical embellishments to small pieces, his teacher being Francesco Bianchi; and these boyish effusions were so well received that in 1810, young as he still was, he was offered and undertook the entire charge of the music at Covent Garden Theatre as composer and director. He continued here for many years, his speciality being the "musical drama," a variety of entertainment now practically extinct, in which the prominent situations of an exciting drama were intensified by music, vocal and instrumental, so that for the moment the drama became converted into an opera. The *opera comique* differs from Bishop's "operas," in that the first is a musical work of which the portions are connected by dialogue, and the latter is a drama of which the dialogue occasionally gives way for the introduction of music at appropriate points. As instances may be mentioned, amongst many works of this class produced at Covent Garden by Bishop, the following:—"The Miller and his Men" contained, amongst other pieces, the delightful round, known to all musical amateurs as "When the wind blows;" "Gny Mannering" gave occasion for the famous glee "The Chough and Crow," and the scarcely less famous "Tramp Chorus;" "The Law of Java" is now known only as the shrine which held the gem of modern glee-writing, "Myneer van Duuek;" and the name of "Clari" will never be forgotten, though the play has long passed from remembrance, for it is immortalized by "Home, Sweet Home." In 1825 Bishop left Covent Garden for Drury Lane, and had the audacity, resulting in well-merited failure, to attempt rivalry with Carl Maria von Weber, whose

masterpiece, "Oberon," the Covent Garden management had the honour of producing. Bishop as a writer of small works was a really great master of his craft, but works of large calibre were beyond his range. "Aladdin," the opera in question, was a *fiasco*; and an almost equally dismal fate overtook his oratorio, "The Seventh Day," written in 1838 for the Philharmonic Society. Yet at this very time he was writing for Vauxhall, of which he was the musical director, "My Pretty Jane," one of the sweetest ballads in English music, inseparably associated with the faultless singing of Sims Reeves. In 1839 he took the degree of Mus. Bac. at Oxford, and in 1841 became professor at Edinburgh University. He was knighted in 1842, and succeeded Dr. Crotch as professor at Oxford University in 1848. In 1853 he became Mus. Doc., producing as his "exercise" an ode performed at the installation of the Earl of Derby as Chancellor of the University. Bishop died in 1855.

BISHOP-AUCKLAND, a market-town in the county of Durham, is situated on an eminence on the south bank of the river Wear, 10 miles S.W. from Durham, and 24½ from London by the Great Northern Railway. The small river Gaunless flows past the eastern side of the town into the Wear. The town is well built, and has of late years been much improved. It has a spacious market-place, in which stands an elegant Gothic bank, and a handsome town-hall, with a very ornamental façade. In addition to the municipal offices the building contains a large music hall or assembly rooms. The town also possesses a good mechanics' institute and two endowed schools. The Bishop of Durham has a palace here, to which is annexed a beautiful Gothic chapel, the whole occupying the site of a former magnificent palace belonging to the bishops of Durham. The Gaunless flows through the bishop's park, which is 800 acres in extent. The town contains large engineering and edge-tool works and some cotton-mills, and in the neighbourhood are some very extensive coal-mines. The population in 1881 was 11,632.

BISH'OPRIC is a term equivalent to diocese or see, denoting the district through which the bishop's superintendence extends. The final syllable is the Anglo-Saxon *rice* (dominion), which entered in like manner into the composition of one or two other words. The word diocese is from the Greek *diokēsis*, which literally signifies "administration." The word *see*, in French *siège*, in Italian *sedia*, signifies "seat," "residence," and is ultimately derived from the Latin *sedes*. The Italians call the holy see *la sedia apostolica*; and the French, *le saint siège*.

In England there are two archbishoprics and twenty-five bishoprics; in Wales, four bishoprics; the Isle of Man forms also a bishopric, but the bishop, and the junior of the rest, provided he be not either of the archbishops, or bishop of London, Durham, or Winchester, have no seat in Parliament.

At the Conquest there were two archbishoprics and thirteen bishoprics:—Canterbury, York; London, Winchester, Chichester, Rochester, Salisbury, Bath and Wells, Exeter, Worcester, Hereford, Coventry and Lichfield, Lincoln, Norwich, Durham.

King Henry I., in 1109, erected Ely into a bishopric, the church of the monastery being made a cathedral.

Near the end of the reign of Henry I. the see of Carlisle was founded. The diocese, before the alterations effected by 6 & 7 Will. IV. c. 77, consisted of portions of the counties of Cumberland and Westmorland, perhaps not before comprehended within any English diocese.

No other change took place till 1541, when King Henry VIII. erected six new bishoprics. These were—1, Oxford; 2, Peterborough; 3, Gloucester; 4, Bristol; 5, Chester; 6, Westminster, the county of Middlesex, which before had belonged to the diocese of London, being assigned to it as a diocese. In about nine years Thirbury, the first and only

bishop of Westminster, was translated to the see of Norwich, and the county of Middlesex was restored to the diocese of London.

The following are the most interesting particulars relating to the English bishoprics, according to the "Clergy List"

PROVINCE OF CANTERBURY.

(Salary of Archbishop, £15,000.)

	Salary.	Area in Acres.	Inhabited Houses.	Population.
	£			
Albans, St., .	4,500	1,439,257	180,999	657,257
Asaph, St., .	4,200	1,067,583	55,132	257,098
Bangor, . . .	4,200	985,946	46,197	209,162
Bath & Wells,	5,000	1,043,059	86,612	430,326
Canterbury, .	—	914,170	106,667	567,091
Chichester, .	4,200	934,851	75,149	416,328
David's, St., .	4,500	2,272,790	93,510	450,039
Ely,	5,500	1,357,765	111,630	519,286
Exeter, . . .	4,200	1,632,140	104,550	601,374
Gloucester and Bristol, . . .	5,000	1,000,503	121,101	637,028
Hereford, . .	4,200	986,241	49,691	237,138
Lichfield, . .	4,500	1,740,607	270,387	1,356,869
Lincoln, . . .	5,000	2,302,814	162,917	757,491
Llandaff, . .	4,200	797,864	92,205	503,584
London, . . .	10,000	181,250	321,199	2,539,617
Norwich, . . .	4,500	1,994,525	149,783	668,123
Oxford, . . .	5,000	1,385,779	115,248	552,772
Peterborough,	4,500	1,240,327	113,467	614,976
Rochester, . .	3,000	316,952	186,722	1,800,000
Salisbury, . .	5,000	1,309,617	80,245	383,514
Truro,	3,000	896,935	74,525	365,412
Winchester, .	6,500	1,115,049	139,169	773,819
Worcester, . .	5,000	1,037,451	202,471	980,982
Total, . . .	—	28,253,478	2,891,576	16,279,316

PROVINCE OF YORK.

(Salary of Archbishop, £10,000.)

	Salary.	Area in Acres.	Inhabited Houses.	Population.
	£			
Carlisle, . . .	4500	1,563,728	65,425	334,786
Chester, . . .	4500	968,312	60,359	561,201
Durham, . . .	7000	616,528	178,373	1,077,569
Liverpool, . .	3500	262,819	120,000	890,512
Manchester, . .	4200	583,085	374,902	1,893,542
Newcastle, . .	3500	1,290,312	80,000	484,024
Ripon,	4500	2,098,582	305,664	1,357,053
Sodor and Man,	2000	145,325	9,413	54,042
York,		1,730,704	197,387	1,060,878
Total,		9,259,390	1,391,523	7,663,607

From the year 1541 until 1836 no change was made in the diocesan distribution of England. Before the passing of 6 & 7 Will. IV. c. 77, the revenues were not in any degree proportionate to the extent or population of the diocese, as they arose chiefly from lands, the revenues from which varied greatly. The Act 6 & 7 Will. IV. c. 77, created a new bishopric in England (that of Ripon), and provided for the union of the bishopric of Bristol with

that of Gloucester. This Act not only remodelled the diocesan divisions of England, but provided for a fresh distribution of the revenues of the different bishops according to a certain fixed scale. The diocese of Manchester was created by the 10 & 11 Vict. c. 108, which also modified the dioceses of St. Asaph, Bangor, and Chester. The bishopric of St. Albans was created in 1875, with the view of relieving the Bishops of Winchester and Rochester of part of their duties; and that of Truro, in 1876, in order to relieve the Bishop of Exeter. A bishopric of Liverpool was created in 1879, one of Newcastle in 1882, and one of Bristol in 1884.

The surplus revenues from the richer sees are paid into the hands of the Ecclesiastical Commissioners, and constitute what is called the Episcopal Fund. In 1869 an Act was passed (32 & 33 Vict. c. 111), enabling bishops who had become incapacitated by infirmity to resign—their successor being obliged to pay them either £2000 a year or a third of the income of the see, if that would amount to more than £2000 a year, during their lifetime.

The bishopric of Man is traced to Germanic, one of the companions of St. Patrick, in the fifth century. Sodor, which is supposed to be a Danish term for the Western Isles of Scotland, was under the same bishop till the reign of Richard II., when, the Isle of Man having fallen under the English sovereignty, the islands withdrew themselves, and had a bishop of their own. The nomination of the bishop was in the house of Stanley, earls of Derby, from whom it passed by an heiress to the Murrays, dukes of Athole. This bishopric was declared by Act 33 Henry VIII. to be in the jurisdiction of the province of York. The Act 6 & 7 Will. IV. c. 77, actually united (prospectively) the bishopric of Sodor and Man to that of Carlisle, but by 1 Vict. c. 30, it was continued as an independent bishopric.

The Isle of Wight and the isles of Jersey and Guernsey with the small islands adjacent, are in the diocese of Winchester; the Scilly Isles are in that of Truro.

At the Revolution the Presbyterian Church of Scotland was acknowledged as the national church; but there is still an Episcopal Church in that country, the members of which are there in the character of Dissenters. There are seven bishops belonging to the Scotch Episcopal Church—viz. Argyle and the Isles, Brechin, Edinburgh, Glasgow and Ayr, Moray and Ross, St. Andrews, and Aberdeen.

Before the passing of 3 & 4 Will. IV. c. 37, and 4 & 5 Will. IV. c. 90, there were four archbishoprics and eighteen bishoprics in the Protestant Church of Ireland. By the above Acts the archbishoprics were reduced to two, Armagh and Dublin, and bishoprics to ten—viz. Meath, Ossory, Down, Killaloe, Cork, Limerick, Tuam, Derry, Kilmore, and Cashel. Since 1871 the Irish bishops and archbishops have had no connection with the state.

BISHOP'S CASTLE, a market-town of Shropshire, is 17 miles S.S.W. from Shrewsbury, and 186½ from London. It is the terminus of the Bishop's-Castle branch of the Shrewsbury and Hereford Railway, and is 10½ miles from the Craven Arms Junction. It probably derives its name from a castle belonging to the bishops of Hereford, which formerly stood there. The town stands on the declivity of a hill, near the river Clun, and is irregularly built. Several new houses have been erected in recent years. It contains a town-hall, a handsome market-house, and a fine old Norman church, which was rebuilt in 1860. Until the Reform Act of 1832 this place returned two members to the House of Commons. Population of the parish, 2100.

BISHOP'S STORTFORD, a town of Hertford, is 32 miles from London by the Great Eastern Railway. It stands on the Stort, and the manor once belonged to the bishops of London. The town, which on the whole is well built, is in the form of a cross, the two principal streets intersecting each other, with the market-place in the centre. A great deal of corn is accumulated here, and the malting

trade carried on to a great extent. The parish church possesses a fine lofty tower. There are also two district churches and places of worship for all denominations of dissenters—those for the Congregationalists and Wesleyans being new and elegant buildings. The educational wants of the inhabitants are amply provided for in a high school, collegiate school, diocesan training college, and several private schools. Population, 6704. Stortford was in existence before the Norman Conquest, and its castle, known as Waytemore Castle, was presented by William the Conqueror to Maurice, bishop of London, and his successors. The building was, however, demolished by King John, and only a few ruins remain.

BISHOP'S WALTHAM, a market-town in Hampshire, 9 miles S.S.E. from Winchester, and 82 from London by the South-western Railway. The principal buildings of interest are the parish church, a neat Congregational chapel, and the Royal Albert Infirmary, a very pleasant commodious structure, with a terra-cotta statue of the Prince Consort crowning the portico. There is a national school, and a handsome British school accommodating 200 children. The population is 2481. The town has had a rather important history, and was the seat of a bishop's palace, the ruins of which still remain.

BISHOPSTOKE, a town of Hampshire, 6½ miles from Winchester, and 72 from London by the South-western Railway, is a place of considerable importance as a centre of local trade. The Itelin, on which Bishopstoke is situated, is navigable to Winchester, and heavy goods are thereby transmitted to that city on the one hand and Southampton on the other. A great cheese market is held here the third Thursday in every month, the railway being carried direct to the sheds and stores. Population, 1537.

BISHOP-WEARMOUTH. See SUNDERLAND.

BISLEY, a small town in Gloucestershire, 9 miles S.E. from Gloucester and 3 from Stroud. The church is ancient, and contains some interesting monuments. The parish, which is large, and contains several villages, has a population of 5169. There are manufactures of woollens.

BISMARCK-SCHONHAUSEN, KARL OTTO,

PRINCE VON, the greatest German statesman of modern times, was born 1st April, 1815, on the Schönhausen estate, situated in Prussian Saxony. The noble family of which he is a member originally came from the Mark of Brandenburg, where its history can be traced as far back as the twelfth century. One of its members, Friedrich Von Bismarck, exchanged the Brandenburg estates for those of Schönhausen, Crevese, &c., and became through his two sons the ancestor of the two flourishing families of the Bismarcks of Schönhausen and those of Crevese. Both families belong to what in Germany is called the *junker* class, a branch of the landed aristocracy of that country, whose members have devoted themselves chiefly to military service. The officers of the army, up to the close of the eighteenth century, were exclusively drawn from the ranks of the *junkers*, and at the present day the majority of them are still of noble origin. Intensely Conservative, proud and narrow, this branch of the nobility has ever been the most devoted to the support of the throne, and exceedingly jealous of its own class privileges. The father of Prince Bismarck was a major in the Prussian army; but as he intended his son for the civil service of the state, the young Bismarck followed the military profession for the period of one year only as required by law. He studied law at Göttingen, Berlin, and Greifswald, passed the necessary preliminary trials, and then for a time retired to pass the life of a country gentleman. His college career appears to have been marked by a somewhat impetuous and boisterous pursuit of the pleasures incidental to the life of a German student, not excluding the indulgence in copious libations and the fighting of about twenty duels, one of which left a permanent scar upon his face. In

1846 he entered public life, being elected a member of the Diet of Prussian Saxony and of the General Diet in 1847. Firmly attached to the feudal traditions he had inherited, possessed of exuberant animal spirits, and an overbearing pugnacious disposition, he soon became marked as one of the most narrow and bigoted members of the Conservative party. So outspoken and reckless did he appear in his defence of the absolutism of the sovereign and of the privileges of the aristocracy, that his own party looked upon him as being too extreme in his views, and too rash in his exposition of them, while the advanced Liberals almost regarded him with contempt. His evident ability, however, soon made itself apparent; and though no orator, in the usual sense of the word, his vigorous and pointed speech always commanded the attention of his audience. During the revolutionary epoch of 1848 he retired for a time from parliamentary life, but returned in 1849, and was unwearied in his efforts to oppose the programme of the revolutionists, and loudly declared his approval of the reactionary policy of the Prussian prime minister, Baron Manteuffel. The latter in return, in May, 1851, appointed Bismarck to the restored Diet at Frankfort, as First Secretary of Legation, and three months later promoted him to the rank of ambassador. This post he occupied for a period of eight years, until the beginning of 1859. To this Diet he went, as he has since declared, with strong sympathies in favour of Austria; and in a speech made during the year previous to his appointment, he publicly declared that Prussia should place herself in a subordinate position to Austria, in order the better to combat German democracy. During his occupation of this post, however, his views underwent an entire change, and he there formed the first plans of that policy which afterwards served to change the face of Europe. The representative of Austria at the Diet was the minister, Herr Von Rechburg, and the two men soon became determined opponents, their skirmishes awakening lively interest among the other members. One of these, which afterwards became famous, took place as follows:—the Austrian ambassador called a council of the members of the Diet at his own house, and by way of impressing them with his dignity, received them in his dressing gown. Bismarck, to be even with him, drew his cigar case out of his pocket, and offering a cigar to his neighbour, took one himself, and immediately lighted it saying, without waiting for an answer, "You have no objection, dear count?" On the outbreak of the Italian war, the people of Germany took the side of Italy and France against Austria, and there can be little doubt that the sympathies of Bismarck were in the same direction. The court at Berlin, however, was inclined towards Austria, and accordingly thought it better to remove its energetic ambassador out of the way of events by sending him to St. Petersburg, where he remained from April, 1859, to the spring of 1862. During this stay he had excellent opportunities for making a study of the condition of the Russian court and people, the knowledge thus gained being of immense service to him in the later stages of his career. He also contrived to keep himself fully abreast of the tide of German politics, and though absent he exercised so much influence as to arouse considerable adverse criticism from the Liberal press of Prussia. In the autumn of 1861 Bismarck had an interview with the king at Baden-Baden, and there explained his views as to the future policy of Prussia with such effect that the king commanded him to elaborate and complete the sketch he had given, and to put it in writing. The following year, on the dissolution of the Prussian Chambers for refusing to vote the increase in the army, Bismarck was recalled from St. Petersburg, and invited to enter the ministry. He declined this offer, but obtained the post of ambassador at Paris. Here he entered into intimate relations with the court of the Tuileries, and during the summer contrived to secure a secret understanding

with the French government, by means of which he was able to deal with Austria without the least fear of French intervention. While at Paris Napoleon III. gave him the Cross of the Legion of Honour, as a proof of his esteem; but his success at Paris only served to increase his unpopularity at home, and when on the 24th September, 1862, he became Prussian minister of foreign affairs, he had but little prospect of gaining the good-will of the Lower Chambers. Certainly he made no attempt to do so; but losing his patience at the first opposition he encountered, placed himself at the head of the Junker party, and treated the representatives of the people with the utmost contempt and defiance. His budget and army reorganization measures were sharply criticised and opposed when they were presented, and in return the Chambers were twice dissolved, and a third time they were simply sent home with the intimation that the budget would be settled without them.

Not only was this indifference shown towards the powers of the deputies, but they were treated in addition by Bismarck and his colleague, the minister for war (Herr von Roon), with the most reckless insolence. In the contest the ministers were completely victorious; and to carry out more completely their schemes, they went further, and suppressed not only the liberty of the press, or such liberty as had been previously enjoyed, but they also successfully prosecuted the members of the Chambers for their speeches against the government delivered in the House itself. So intense was the feeling aroused by their conduct that the crown prince publicly expressed his disapproval of some of the measures, and wrote a letter of protest against the ministry; but, secure of the support of the king, the ministers steadily pursued the course they had marked out. By the beginning of 1863 the army was ready, and Bismarck had already commenced to pick a quarrel with Austria, when his plans were altered for a time by the death of the King of Denmark on the night of the 14th November of that year. This event brought the question of the future of the duchies of Schleswig-Holstein up for immediate settlement. The German Diet at once caused the territory to be occupied by Saxon and Hanoverian troops, but Bismarck also sent a force of Prussians along with them. On this Austria declared she must send a force also, and Bismarck skillfully used the event to set Austria against the smaller German states, and unite with him in taking interim possession of the duchies. This arrangement soon afforded the means for bringing about the war he had so long desired. He had already secured the aid of Italy, which wanted Venetia, and had bribed the Emperor of the French into neutrality by promises which were afterwards repudiated. He now, in addition, applied himself to obtain the support of the leaders of the Liberal party, and sure that his plans were ripe, explained the objects for which he had laboured, and which he declared had compelled him to disregard for a time the rights of the Houses. The idea of the expulsion of Austria from Germany, and the promotion of German unity under the guidance of Prussia, which he put forth, served to gain the confidence of his former opponents, and the triumphant result of the war with Austria in 1866 completed the transformation. By this victory he obtained the exclusion of Austria from the Germanic Confederation, incorporated Hanover and Frankfort with Prussia, and concluded an offensive and defensive alliance between the smaller German states and Prussia, the latter being placed in the supreme command of the army. For the internal arrangements of Germany a Federal Council, to be composed of delegates from the various states, was also provided, and a Diet elected by universal suffrage, Bismarck becoming chancellor of the Confederation and president of the Council. "Nothing succeeds like success," and from this period a new phase of his career may be said to commence. His countrymen now

saw that for which their best thinkers had long aspired in vain accomplished at a stroke, and they were quite willing to forgive their champion for having used unconstitutional means to carry out his plans. A national party pledged to support the minister now appeared, and a new feeling of dignity and power was imparted to the German people. These changes, however, aroused feelings of intense dissatisfaction in France, and the growth of a strong and united Germany was regarded as a serious disturbance to the balance of power, and as a menace to the French territory. Bismarck had hitherto managed to keep the French emperor from interfering with his movements, by leading him to believe that he would be permitted, in return for his forbearance, to acquire the duchy of Luxembourg, and even to annex Belgium. An unsigned treaty to this effect, drawn up by M. Benedetti, the French ambassador to Berlin, was published in July, 1870, the authenticity of which has never been disputed. Now, however, when Bismarck had succeeded in firmly establishing the Prussian supremacy in Germany, and had proved the efficiency of the army, he strenuously opposed the cession of Luxembourg to France, and obtained instead its neutralization and the dismantling of its fortresses—the French emperor, whose army was quite unprepared for war, being compelled to submit. In July, 1870, it transpired that the crown of Spain had been offered to Prince Leopold of Hohenzollern, and the news awakened a feeling of intense indignation in France. It was soon announced that the offer had been declined by Prince Leopold, but the French emperor, who had commenced preparations for war, demanded guarantees for the future, which the King of Prussia refused to give. On the 13th July, after the renunciation of the candidature, Bismarck told Lord A. Loftus, the British ambassador, that unless some assurance were given by France in an official form that the solution of the Spanish question was a final and satisfactory settlement of the French demands, and that no further claims were to be raised; and if, further, a withdrawal or a satisfactory explanation of the menacing language held by the Duc de Gramont in the French Chambers were not made, the Prussian Government would be obliged to seek explanations from France. Germany, he added, was prepared for war. On the same 13th July was telegraphed all over Europe an incorrect version of an interview between M. Benedetti and King William at Ems. The war feeling was raised in intensity both at Berlin and Paris by a story of rudeness rebuffed. On the 15th England's offer to mediate was declined by Bismarck and Gramont respectively, and preparations for war were announced in the French Legislative Chamber. The declaration of war from France was laid on the table of the North German Parliament by Bismarck on the 20th of July. He stated at the same time that there was one despatch from Paris that he did not lay before the king, because the demand contained therein, of an apology from the King of Prussia to the Emperor of the French, appeared to him ridiculous. The direction of public affairs in the momentous war that followed, though modified by military requirements, never passed out of the hands of the Prussian prime minister. Much, indeed, devolved upon warriors and generals, yet the man of sage counsel and stern resolve was always near his sovereign. In the course of a few months the French were entirely defeated, and compelled to accept the terms dictated by the conquerors. During the progress of the war, in January, 1871, the King of Prussia was crowned Emperor of Germany by the assembled princes in the palace of Versailles. The same month saw Bismarck appointed chancellor of the German empire, and two months later he was raised to the rank of prince. Immediately after the war he set about effecting a reconciliation with Austria, and in September, 1871, brought about a meeting between the Emperor of Austria and the German

emperor at Gastein. Another meeting, between these emperors and the Czar of Russia, was also arranged in 1872, resulting in the formation of a triple alliance. About this time Bismarck began a conflict at home with the Ultramontane party, and made strenuous efforts to enforce the authority of the state over the church. He commenced and carried on his attack with his customary determination, but the question is not yet decided, and it seems probable that he may have to compromise matters with this party, which is well-drilled and persistent in its opposition. From this period Bismarck became the foremost statesman of Europe; and though his efforts in domestic legislation were often defeated, he conducted the foreign affairs of Germany with unexampled skill and ability. After the Russo-Turkish war of 1877-78 he presided at the congress of Berlin, his influence being strongly exerted in favour of peace. The Russian chancellor, however, Count Gortschakoff, was greatly disappointed in not receiving more support from him, and his vexation led him to make some indiscreet bids for an alliance with France. Bismarck promptly met these menaces by effecting an offensive alliance with Austria, an arrangement which was renewed for ten years in 1882. In his home policy Bismarck was frequently thwarted by a combination of the various parties into which the Prussian Chambers are divided, but, supported in everything by the king, generally managed to get his own way in the end. Even those of his opponents who regarded his schemes for internal affairs with the strongest aversion were convinced of his intense patriotism, and were quite content to trust the foreign policy of Germany to his direction.

Prince Bismarck was married early in life to a lady named Johanna von Puttkammer, to whom he has ever been greatly devoted. They have three children—a daughter, Mary, and two sons, Herbert and William. The eldest son is in the diplomatic service of Prussia, the younger has studied law and entered the Prussian Chamber. Some very interesting details of the private life of the prince have been published by his friend and former secretary, Dr. Moritz Busch. From this we learn that in regard to the prince's religious principles in early years he inclined towards the philosophy of Spinoza and Hegel, but later in life he must be called a pious man in the purest sense of the word. He bases his opinions and resolves upon religion, and considers death as *jeu de rite*, but he does not make friends with an intolerant priesthood. In many letters to his wife he expresses regret at the unbelief of his younger years, and says that he cannot conceive how any one who will not believe in God and eternal life should be able to bear mortal existence. When Bismarck received the Dannebrog decoration he was obliged to select a motto for his arms. He selected one with a double signification, *In trinitate robur*—that is, "I seek my force in Trinity." It is generally believed that Bismarck is also rather superstitious, and many stories are told concerning his weakness in this respect. Dr. Busch states that most of them are apocryphal, and says that on this point the chancellor has declared, "The jests about my superstitions are nothing but jests or consideration of the feelings of others. I will eat at table with twelve others as often as you like, and will undertake the most important and serious business on a Friday." In his younger days he was an ardent athlete, a bold rider, and was passionately fond of hunting and shooting. He gained trophies in all parts of Europe—in his own woods, in the Taunus, the Ardennes, and the Alps, in the park of Ferrières, in the forests of Sweden and Russia, where he hunted the bear, the wolf, and the wild boar. The prince is also an excellent linguist. He speaks German without the slightest accent, and French so perfectly as to satisfy even Frenchmen. English he speaks most fluently, and of Italian he knows enough to understand what he reads and what is said to him. He has even learned Polish and Russian, and the Emperor Alexander II.

is said to have been wonderfully surprised when Bismarck addressed him in pure Muscovite.

To present an estimate of the character of the prince, or of the value of his work as a statesman, hardly comes within the scope of a notice like the present, nor if it did would it be possible at the present time. Another generation at least must pass before judgment can be fairly pronounced. Whatever this final decision may be, it can be truly said that as a statesman he has displayed immense mental power, that his plans have ever been clearly conceived, and that he has displayed great courage, strength, and skill in carrying them to their conclusion. His intense patriotism and faith in the greatness of Germany have been admitted even by his bitterest enemies; and when the political condition of Prussia and Germany before his advent to power are compared with their position at the present time, it must be felt that he has succeeded in effecting changes enormous in their extent and influence. In saying this the fact is not overlooked, that the raising of the edifice of a united Germany has been the work of many hands. Poets, thinkers, military leaders, and a valiant army of citizen soldiers have all had a share in the work; but it cannot be denied that in the reduction of the ideal to the actual, Bismarck has been the moving spirit and the leader under which it has been carried out. On the other hand, it cannot but be admitted that the price which the country has had to pay has been very heavy. The progress of constitutionalism has been rudely checked, and a great addition has been made to the financial and military burdens laid upon the nation. The wars by which the result has been obtained, though successful, have not been gained without a heavy expenditure of blood; and the additions made to Prussian territory after the war with France have brought with them a feeling of insecurity and anxiety that proves a constant excuse for adding to the expenditure on the army, and greatly hinders the peaceful progress of the country. Concerning the price that has been paid by Germany, the words of the prince himself on this point are suggestive. According to Dr. Busch, on one autumn evening in 1877, Bismarck was sitting by the fireside in a room adjoining the greenhouse of Varzin, and apparently almost overcome with melancholy, he complained bitterly that his political career had given him no pleasure and no satisfaction. "There is no one who loves me for it," he said. "It does not make me popular. I have never made any one happy in all my life—neither myself, nor my family, nor the nation at large." His friends protested against this accusation, but he persisted in saying that the numbers he had made unhappy far exceeded those that he had made happy. "If it was not for me," he said, "the world would have seen three great wars less, and eighty thousand who died in their bloom might have lived; and how many parents, brothers, sisters, widows, would have been spared their grief and tears!" And he said all this in a tone resembling Hamlet's when he asks, "To be, or not to be?" One thing, however, is certain, that whatever verdict may be ultimately pronounced, there can be no question that when the history of this century is written Bismarck will rank among the foremost of the statesmen of Europe, perhaps may be even regarded as the greatest of them all. See "Graf Bismarck, Ein Charakterbild" (1867); "Count Bismarck, a Political Biography," by L. Bamberger (Breslau, 1869—English translation, London, 1869); "Life of Bismarck," by Gorlach (English translation, Tauchnitz, 1875); "Count Bismarck and his People," a wonderful Boswellian collection of anecdotes by Dr. Moritz Busch (1879); and "Our Imperial Chancellor," by the same author (1884).

BISMUTH. This metal was first described by George Agricola in 1546 as a "metal somewhat different from lead," and also by Basil Valentine. It generally occurs native, sometimes combined with sulphur, but rarely with oxygen. The minerals from which it is obtained are rare;

they are found in Norway, Sweden, United States, Cornwall and Cumberland in England, and Stirlingshire in Scotland. *Native or octahedral bismuth* occurs in opaque crystals, having a metallic lustre, a specific gravity about 9.7, and a reddish silver-white fracture. *Bismuth-ochre* (Bi_2O_3) is a straw-coloured mineral, consisting of an oxide of the metal, and having a specific gravity of 4.36. *Bismuth-glance* (Bi_2S_3) is a lead-gray coloured mineral, occurring in four-sided prisms, having a perfect cleavage, a metallic lustre, and a specific gravity of 6.549; it is a sulphide of the metal. It also exists as a carbonate (*Bismuthite*, Bi_2CO_3), as a silicate (*Bismuth-blende*, Bi_2SiO_5), and in the metallic state combined with copper, nickel, and cobalt. The market is supplied from a cobalt ore in Saxony. The metal is easily separated in a crude state by fusing the ore. The crude metal is contaminated with arsenic, iron, copper, and silver. It is purified by solution in nitric acid and precipitation, as basic nitrate by a large excess of water. It is purified with difficulty from tellurium, of which it often contains traces. This is a very inconvenient impurity, as bismuth is largely used in medicine, and the slightest trace of this substance renders the exhalations of the patient taking it most offensive.

Bismuth is of a grayish-white colour, with a perceptible red tinge; its lustre is considerable, and its structure lamellated. It is the most crystallizable of all the metals, and may be obtained in beautiful pyramidal cubes; it is so brittle as to be easily reducible to powder when cold; its density is 9.83, which by cautious hammering while warm may be increased to 9.88; it melts at 264°C . (507°Fahr .), and expands on cooling. Its symbol is Bi.; atomic weight, 208. It is the most diamagnetic of all the metals; it is di-, tri-, and pent-atomic.

Oxygen and bismuth form two definite compounds (bismuthous oxide, Bi_2O_3 , and bismuthic oxide, Bi_2O_5); the former may be obtained by heating the metal in the air. It takes fire and burns with an obscure flame, and is converted into a yellow powder, which melts into a fusible glass at a red heat. None of the usual alkalies dissolve this oxide. Bismuthic oxide is obtained by heating the protoxide with a solution of chloride of lime or soda; it is a heavy deep-brown powder, strongly resembling peroxide of lead; when heated to about 600° it is decomposed, oxygen gas is evolved, and yellow bismuthous oxide remains. It is also called bismuthic acid, and forms salts with the fixed alkalies.

Chlorine and bismuth combine in two proportions—the trichloride (BiCl_3) and the dichloride (BiCl_2); the former is a white, easily fusible substance, obtained by combination of the two elements, and the latter by heating the trichloride with metallic bismuth. When a solution of the nitrate is acted on by common salt, oxychloride of bismuth (BiClO) is thrown down as a white powder; this is known as a pigment under the name of "pearl white."

Fluorine and bismuth form a fluoride which is soluble in water, and which precipitates during evaporation in the state of a white powder.

Bromine combines with bismuth to form the tribromide BiBr_3 , a steel-gray coloured substance which fuses at 200°C . (392°Fahr .) A dibromide has also been described.

Iodine unites with bismuth to form an orange-coloured substance, insoluble in water (the tri-iodide, BiI_3).

Sulphur and bismuth combine to form two sulphides—the disulphide (BiS) and the trisulphide (Bi_2S_3). The latter has a metallic lustre and a crystalline texture; it is not very fusible, and its density is 6.5. Sulphuretted hydrogen throws down black sulphide from the solutions of this metal, and also converts its oxide into sulphide.

Phosphorus has little affinity for bismuth, which it renders more brittle. Carbon and boron do not combine with it. Selenium unites with bismuth to form a silver-white substance having a metallic lustre, and easily fusible.

Bismuth combines with the metals generally to form alloys, and usually renders the metal with which it unites more fusible.

Potassium, sodium, arsenic, antimony, and tellurium all form alloys with bismuth. It imparts brittleness to copper, silver, tungsten, palladium, rhodium, gold, and platinum, when alloyed with them. With mercury it forms a very fluid alloy. The so-called "fusible metal" is composed of two parts of bismuth, one of lead, one of tin; this alloy melts at 93.75°C . (200°Fahr .) It is thus melted by boiling water, and used for making surprise teaspoons, which disappear when used. The alloy expands on cooling, and therefore takes a most accurate impression of the mould. It is used for copying dies. By adding mercury the fusing point can be sufficiently reduced to copy anatomical preparations.

Bismuth and acids combine to form salts of bismuth. The nitrate is the most important and most easily obtained; it is a colourless solution, capable of yielding deliquescent crystals. The carbonate is a white tasteless powder. Most of the salts of bismuth are colourless.

Bismuth is principally employed for the purpose of making fusible alloys, and as an ingredient in solders and in medicine. It is often called in the arts *tin-glass*.

Medicinal Properties.—For medicinal purposes, for which it must be most carefully purified, the basic nitrate or *magistery* of bismuth is largely employed as a tonic, and for dyspepsia and vomiting caused by irritation of the mucous membrane of the stomach, as it is insoluble in the animal juices. It is also given in solution effected by the addition of citrate of ammonia; dose, 5 to 20 grains. In large doses it is poisonous, and produces vomiting, with small pulse, faintings, and even death, the stomach exhibiting erosions and signs of inflammation. Even its external application is not free from danger, for the cosmetic termed "pearl white," "Spanish white," or "flake white," which is basic nitrate of bismuth, when applied for a length of time to the face causes nervous twitchings, and finally paralysis. As pearl white is blackened by sulphuretted hydrogen, the face of those who employ this cosmetic is blackened by the internal use of the Harrogate or other sulphurous waters, or of sulphur in any form.

BISON is a subgenus of the generic group Bos. Of this section two species now exist, the European bison, or Aurochs of Lithuania, and the American bison of the prairies of the Arkansas, Platte, and Missouri. The bison (*Bison bonasus*), the *Bison jubatus* of Pliny, the *bonasus* of Aristotle, the *bison* of Oppian, is now known under different appellations, viz. *bison*, *viseu*; *visont*, of barbarous and most ancient origin; *our*, *auer*, *ur*, *auerochs*, *auerochs*, &c., from a primitive (and perhaps Celtic) root. Its Polish name is *tur*; its Russian, *tor*; Danish, *zyr*; Moldavian, *zimbr*; and Lithuanian, *zubr*.

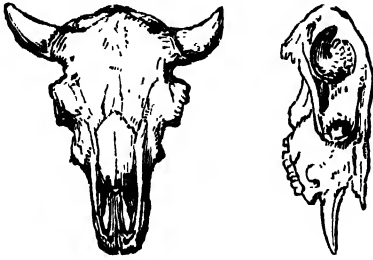
European bison or Aurochs.—In former times a huge wild ox called bison, bonassus, or monassus, spread over the central portion of Europe, was common in Pæonia (the modern Bulgaria), Hungary, Poland, and further westward even to Britain, if then separated from the continent. In Cæsar's time, however, this wild ox was extirpated in our island, and in the portions of the Continent immediately adjacent; but its fossil relics yet remain, and these relics, compared with those of a huge long-horned ox, incontestably prove that the ancient *bison* and the *urus* were distinct species.

In the British Museum are remains of the fossil bison called *Bison prisus*. The skull is remarkable for the convexity and bold swellings of the forehead, and the horns, which are larger than those of the modern aurochs, at least in general, spread laterally with even a backward inclination. The subjoined figures of the fossil skull of the bison or aurochs are from the Paris Museum.

Both the *urus* and the bison continued to exist in the

wilds of Europe until a late period of the Roman Empire, and were occasionally captured and exhibited alive in the shows of the amphitheatre.

Professor Owen has rigidly compared the fossil relics of the bison with the bones of the present Lithuanian animal (of which a noble specimen was presented by the late Emperor of Russia to the British Museum). His opinion respecting the specific identity of the modern and ancient bison is decidedly expressed; and he concludes by saying—"I cannot perceive any adequate ground for abandoning



Front View. Fossil Aurochs.

Profile View.

the conclusion, from a study of the less perfect materials available to that end before the arrival of the entire skeleton of the Lithuanian Aurochs, viz. that this species was contemporary with the mammoth, the tichorrhine rhinoceros, and other extinct animals of the Pliocene period."

The mammoth, the rhinoceros, and the urus, little less than an elephant in stature, have been extirpated; but the bison has had a better fate. It still survives in the wilds of Lithuania, protected under most stringent laws by the Emperor of Russia; and also in some parts of the Caucasian range, viz. the country of the Tzulinian Tartars.

This noble beast is wonderfully massive and robust in its proportions; its withers are thick and greatly elevated, and covered, as are the neck, sides of the head, lower jaw and throat, with long rough crimped hair, hanging like a mane beneath the throat. This rough mane is often a foot in length, and is thickest during the winter; it is most conspicuous in old bulls—little so in the females. The hair covering the trunk and limbs is soft and woolly. The tail is short, and furnished with a tuft of stiff hairs at its



Aurochs.

extremity. The eyes are small, but their expression is wild and savage, and when the animal is irritated they glare with fury. The tongue, lips, and palate are blue. An odour, described as between that of musk and violets, is exhaled from the skin, and especially that portion which covers the convexity of the forehead. This odour is much stronger in the male than in the female, and may be perceived at a considerable distance from the herd. The horns

are stout, round, and lateral, with the points sweeping upwards and forwards. The head is heavy and carried low. The male aurochs is more than 6 feet high at the shoulders, and is a most powerful and formidable animal. Its strength is such that, as we are assured by Dr. Weissenborn, trees of 6 inches in diameter are levelled by the thrust of a bull. He fears neither the wolf nor the bear, but assaults them with horns and hoofs, and smites them prostrate. An old bull is a match for four wolves, and although a pack of wolves may sometimes hunt down a strayed beast, the collected herd has nothing to fear from any animal. Notwithstanding its massive bulk, the aurochs is very swift for a short course; it rushes forward with its head low, its hoofs being raised at every step above the forehead, and scatters the earth in its career. It is fond of the bath, and swims with ease and vigour, and is partial to dense thickets near the swampy banks of rivers. In the winter the herds retreat into the most dense and secluded parts of the vast pine forests, where they keep quiet by day, but rouse up during the night to browse on the young shoots and the bark of sapling trees. At this season the foresters put supplies of food for them in the vicinity of their haunts.

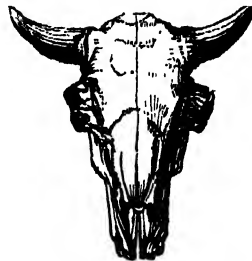


Profile View

Young Aurochs.



Front View.



Front View.

Old Aurochs.



Profile View

They are fond of tree lichens. On the return of spring they visit spots where the herbaceous plants are beginning to vegetate.

When taken young these animals may become to a certain degree familiarized with their keepers, but they will not endure the presence of other persons; nor are the keepers always safe, and, as a precaution, usually wear the same sort of dress when going near them.

It is remarkable that the aurochs displays the greatest antipathy towards ordinary domestic cattle; it avoids the neighbourhood of spots where they feed, or, if the contact is unavoidable, its fury is excited, and it attacks and gores them. All attempts to obtain a mixed breed between the aurochs and the domestic cow have utterly failed. The common ox has thirteen pairs of ribs, the aurochs fourteen pairs; the lumbar vertebrae of the common ox are six in number, those of the aurochs five; the front of the common ox is flattened, that of the aurochs protuberant, and broader in the proportion of three to one, while the occipital space between the horns forms an arch instead of being flat. The

subjoined figures represent the skulls of the aurochs, young and old, in front and profile.

With regard to the senses of the aurochs, that of smell appears to be in the highest perfection, and the herd can only be approached from the leeward. Its flesh is in high esteem, and is said to have a bluish tinge when roasted. The colour of this animal during the summer is a deep brownish black, but the fur acquires a grizzled and rusty brown tint in the winter, previously to its falling off, and its renewal in the spring.

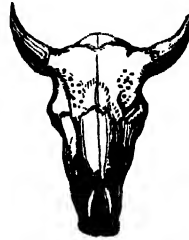
American Bison (Bison Americanus), *Peecheek* of the Algonquin Indians, *Mooseoosh* of the Crees, *Adgidah* of the Chippewayans.—The American bison has many points of similarity with the aurochs. In both are seen the huge head, the lengthened spinous processes of the dorsal vertebrae, for the attachment of the brawny muscles that support and wield it; in both the conical elevation of the withers, and the shaggy mane; and each presents a model of brute force, formed for plunging forwards, and bearing down every obstacle.

The American bison, driven back by the tide of European colonization into the remote wilds, still exists in Louisiana; and herds roam over the prairies that are watered by the Arkansas, Platte, Missouri, and by the upper branches of the Saskatchewan and Peace rivers. Great Slave Lake, in lat. 60°, was at one time the northern boundary of their range; but of late years, according to the testimony of the natives, they have taken possession of the flat limestone district of Slave Point, on the north side of that lake, and have wandered to the vicinity of Great Marten Lake, in lat. 63° or 64°. "As far," says Sir John Richardson, "as I have been able to ascertain, the limestone and sandstone formations lying between the great Rocky Mountain ridge and the lower eastern chain of primitive rocks, are the only districts in the Fur Countries that are frequented by the bison. In these comparatively level tracts there is much prairie land, on which they find good grass in the summer, and also many marshes overgrown with bulrushes and carices, which supply them with winter food. Salt springs and lakes also abound on the confines of the limestone, and there are several well-known salt-lakes where bisons are sure to be found at all seasons of the year. They do not frequent any of the districts formed of primitive rocks, and the limits of their range, to the eastward, may be nearly correctly marked on the map by a line commencing in lon. 97° on the Red River, which flows into the south end of Lake Winnipeg, crossing the Saskatchewan to the westward of Basquian Hill, and running from thence by the Athapescow to the east end of Great Slave Lake."

The American bison is migratory in its habits, wandering in search of food from district to district, and spreading in vast troops over the undulating prairies, where the pasturage is abundant. During the summer they visit the marshes, the rivulets, the streams, and the pools, and delight in the luxury of the bath. Herds composed of upwards of 20,000 individuals have been seen crossing rivers a mile in breadth, on their passage to some distant feeding ground. When the Pacific Railway was first made, these herds often prevented the passage of trains for a considerable time, but of late years their numbers have greatly decreased. They visit the salt-lakes, and are to be found there at all seasons of the year, some leaving the saline morass, others travelling towards it. These herds are incessantly persecuted by the hunter, who often thins their numbers with his rifle; and the Indians get up great hunting matches, using both the gun and bow with admirable address. The flesh of the bison is in great request, and is prepared in various ways. The tongue is accounted an especial delicacy; and the hump, or rather the flesh on the long spinous processes of the anterior dorsal vertebra, forming the withers, is accounted excellent. Much of the

bison meat is made into pemmican for keeping, and a good bison cow furnishes dried flesh and fat sufficient to make a bag weighing 90 lbs. A fat bull has yielded 150 lbs. of tallow. The Indians dress the skins generally with the hair on; they serve as blankets and warm wrappers, and are sold for a considerable sum. The hair is also useful, and is spun and woven into various articles.

The subjoined figures represent in front and profile the skull of a young female bison, and of an adult male.



Young American Female Bison.
Front View. Profile Vi



Old American Male Bison.
Profile View. Front View.

At certain seasons of the year the bulls engage in terrible combats, and perilous is the condition of the man who then approaches them. During the greatest part of the year the bulls and cows live in separate herds, but at all seasons, according to Sir John Richardson, one or two old bulls generally accompany a large herd of cows. They fear not the wolf, but often fall before the grizzly bear.

The American male bison, when at its full size, is said to weigh 2000 lbs., though 12 or 14 cwt. is considered a good weight in the Fur Countries. Sir John Richardson gives 8½ feet as its length, exclusive of the tail, which is 20 inches, and upwards of 6 feet as its height at the fore quarters. The head is very large, and carried low; the eyes are small, black, and piercing; the horns are short, small, sharp, set far apart (for the forehead is very broad), and directed outwards and backwards, so as to be nearly erect, with a slight curve towards the outward-pointing tips. The hump is not a mere lump of fatty secretion, like that of the zebu, but consists, exclusive of a deposit of fat, which varies much in quantity, of the strong muscles attached to the highly developed spinous processes of the last cervical and first dorsal vertebrae, forming fit machinery for the support and movement of the enormous head. The chest is broad, and the legs are strong; the hind parts are narrow, and have a comparatively weak appearance. The tail is clothed with short fur-like hair, with a long, straight, coarse, blackish-brown tuft at the end. In winter the whole body is covered with long shaggy hair, which in summer falls off, leaving the blackish wrinkled skin exposed, except on the forehead, hump, fore quarters, under-jaw, and throat, where the hair is very long and shaggy, and mixed with much wool. In the female the head is smaller, and the hair on the fore parts is not so long as it is in the male.

BISSEX'TILE, from *bissexertus dies*, the name given in the Roman calendar at its reformation by Julius Caesar, when *pontifex maximus*, to the intercalary day which was inserted by his order between the 23rd and 24th February of every fourth year, to correct the six hours surplus remaining over after the civil year of 365 days. Bissexertus, not Bissextilis, is the word used by classical writers. Previously the Roman year had been of 355 days; and as the pontiffs possessed the privilege of inserting the intercalary months of twenty-two days or so which became necessary every alternate year, they frequently wielded it to the great detriment of the state, for they could thus materially shorten the term of office of any magistrate opposed to the aristocracy, or lengthen the year wherein their own partisans held sway. Also, the festivals being dependent on the calendar, no man but the pontiffs could know when these festivals would fall, and necessary ceremonies might be nullified by having been performed on a wrong day. The excess of the true year not being exactly six hours, a further reform has become necessary, but the Julian calendar was an enormous step in advance. It was time that something should be done, for the Roman year had become three months wrong, through the accumulated errors of successive pontiffs, confused in their political manipulations of the year, referred to above. Caesar, in his brilliant way, dashed through the great error by making the Reform Year 445 days long! The great festival of the Terminalia came on the 23rd February, and perpetuated the ancient close of the year according to the early calendar of King Numa, which is why all insertions in the calendar were made at this point. The 24th of February was expressed, according to the Roman reckoning, "Sexto Calendas Martii" -i.e. the sixth day before the Calends, or 1st of March. When the intercalary day was inserted it was also called "Sexto Calendas Martii," and as the name was thus repeated, this day was called the *bissexertus dies*, or the sixth day twice over. By the statute 21 Hen. III. the bissextile day and the day immediately preceding were to be considered legally as one day. See YEAR.

BISTORT. See POLYCONUM.

BISTRE, a brown pigment made of the soot of different kinds of wood, but that of beech is generally preferred. It is used in water colours in the same way as Indian ink.

BISTRITZ (BESZTERECZ), a town of Hungary, is on the river Bistritz, 50 miles N.E. of Clausenburg, and has 7250 inhabitants, who manufacture cloth, leather, and soap, and trade in cattle. It has several churches, a gymnasium, grammar-schools, &c. The surrounding district is intersected by a branch of the Carpathian Mountains, and the climate is severe. The walls and towers, with which it is still surrounded, give the town a quaint mediæval air.

BISUTUN. See BAHISTUN.

BITHUR, a town in the Cawnpore district, North-western Provinces, British India, lying on the south bank of the Ganges, 12 miles N.W. of Cawnpore city. It has a picturesque front facing the river, adorned by ghats or bathing-steps, temples, and handsome residences. Baji Rao, the last of the Peshwas, was banished to Bithur, and had extensive palaces in the town. His adopted son, Dandha Panth, better known as the Nana Sahib, was the instigator of the massacre at Cawnpore during the Sepoy Mutiny. The town was captured by Havelock's force on the 19th of July, 1857, when the Nana's palaces were utterly destroyed; but he himself succeeded in making good his escape. On the 16th of August, after Havelock's first unsuccessful attempt to reach Lucknow, Bithur was once more retaken, and was never afterwards lost.

BITHYNIA, an ancient division of Asia Minor, including part of the Turkish district of Khudawendkiar and the peninsula of Kojali. Bithynia had an extensive sea-coast, indented by two deep bays, the Ginn and the Astæne. It was bounded on the N. by the Euxine (Black Sea), on

the W. by Mysia, on the S. by Phrygia Epictetus, and on the E. by Paphlagonia. Bithynia is described by modern travellers as a fine country. The forests consist principally of oak, with beech, chestnuts, and walnuts. In the southern part the immense mass of the Mysian Olympus, at the base of which Brusa stands, occupies a large part of the country. The summit of Olympus is a gray granite; the sides are marble. The northern part of Bithynia, which consists of the peninsula, is occupied by a chain of hills running westward from the banks of the Sangarius, and terminating on the channel of Constantinople. Between this range and the Lake of Iznik, the ancient Ascania, is a plain country which contains the Lake of Sabanja or Nicomedia. The chief rivers were the Billous (Fihlas), forming the boundary of Paphlagonia, and the Sangarius (Sakariyeh).

The principal cities in this district were—Astacus, on the Gulf of Astacus, which was founded at the beginning of the seventeenth Olympiad by the Megarians; Calchedon, or Chaleedon, opposite to Byzantium, also founded by the Megarians; Prusa ad Olympum, which was the capital of the Ottoman empire before the capture of Constantinople, and is still one of the most flourishing towns of Anatolia [see BROTSSA]; Cius, founded by the Milesians, and restored by Prusias after its destruction by Philip in B.C. 203, was by him called Prusias; Nicæa, on the Lake Ascania, was the birthplace of Hipparchus the astronomer, and Dion Cassius the historian; and Nicomedia, founded by Nicomedes I. B.C. 264, was the birthplace of Flavius Arrianus.

The earliest inhabitants of Bithynia seem to have been the same with those of the neighbouring districts of Mysia and Phrygia; they were called Bebryces, Cancones, and Mygdones. But according to the tradition reported by Herodotus, they were afterwards displaced by a Thracian immigration from the European side of the Propontis (Sea of Marmora); the invading tribe was called the Thyni, or Bithyni. Bithynia was conquered by Cræsus, and at his fall passed with the rest of his dominions into the hands of the Persians. The Bithynians seized the opportunity of the decay of the Persian empire to acquire almost complete liberty, and were strong enough to resist Alexander the Great and his generals. Eventually they formed an independent kingdom under Nicomedes I., which flourished until the downfall of the Persian empire. Nicomedes III., the last king of Bithynia, was expelled by Mithridates, but was restored by the Romans. He was expelled again in 88 B.C. At the peace in 84 B.C. between Mithridates and the Romans he was a second time restored, and dying in 74 B.C. he left his kingdom to the Romans, and Bithynia became a Roman province. There is some information relating to Bithynia in the correspondence of Pliny and Trajan.

BITLIS or **BEDLIS**, one of the most ancient cities of Turkish Armenia, is situated in 38° 34½' N. lat., 40° 30' E. lon., at a distance of about 20 miles from Lake Van. It extends across the greater part of a fine valley at the base of the Nimrod Mountains, but part of it is built on a conical hill, the ascent of which "is so steep, that there is no getting to the top but by wheeling and winding about the mountain." A castle on the top of a hill on the western side of the valley commands the town and its approaches. Bitlis is a great seat of the dancing dervishes, who have twelve convents there. The Armenians have four churches and the Mohammedans several mosques. The country about Bitlis is highly cultivated, producing grain, cotton, hemp, rice, olives, &c. A good trade is carried on, and there are manufactures of gold and silver wares, cotton cloth, carpets, and tobacco. The inhabitants of the town number about 10,000.

BITSCH, a small town and fortress with 2700 inhabitants, is situated on the N. slopes of the Vosges, and commanded by Fort Bitsch, the fortifications of which, partially hewn in the rock, are deemed almost impregnable. In the Franco-German war of 1870-71 Bitsch was

inclosed by the Germans from the middle of August, 1870, till 7th March, 1871, and only capitulated after the preliminary articles of the peace had been signed. The inhabitants manufacture watch-glasses and matches, and carry on a trade in grain, cattle, wood, and peats.

BITTER SPAR, RHOMB SPAR, BROWN SPAR. These names are usually restricted to the large rhombohedrons of *DOLOMITTE* (a carbonate of lime and magnesia), which often contain a small percentage of carbonate of iron that, decomposing on exposure, causes the crystals to turn brown.

BITTERN (*Botaurus*) is a genus of the *HERON* family, belonging to the order *GRALLÆ*. The Common Bittern (*Botaurus stellaris*) is widely spread, inhabiting Europe, Asia, and Africa. It is now rare in England; few



The Bittern (*Botaurus stellaris*.)

breed here, and those that are seen are mostly stragglers from other countries. Before our marshes were drained this bird was abundant, and in the palmy days of falconry afforded the best of sport. It was accordingly protected by severe penalties. The provincial English names of Miredrum, Bull of the Bog, and the name Bittern itself, which is derived, through the French *boter*, from the Latin *botaurus* (*bo*, onomatopæia; *taurus*, bull), is indicative of the bellowing or drumming noise for which the bird is distinguished. The bittern resides in fens, morasses, and marshy places, and amongst the dense flags and reeds along the borders of rivers, where in spring its loud bellowing note is still frequently heard. Its food consists of almost any animals which it is able to overcome and swallow, such as small mammalia and birds, fishes, frogs, newts, and insects. It feeds principally at night, and remains in concealment during the day, when it is not easily driven from its retreat. When forced to rise its flight is not vigorous, but it wounded it defends itself courageously from both dogs and men, and is able to inflict severe injuries with its sharp and powerful bill. The nest of the bittern is composed of sticks, reeds, &c., and is placed amongst the thickest parts of the marsh herbage, usually close to the water's edge. The female lays four or five eggs of a pale-brown colour, and the young when hatched remain in the nest and are carefully tended by their parents until they are able to provide for themselves.

The flesh of the bittern was formerly in high esteem, nor is it despised at the present day. When well fed its flavour somewhat resembles that of the hare, nor is it rank and fishy like that of the herons generally. In size the bittern is less than the common heron, being about 80 inches in length. The bill is about 4 inches long—brown

above, greenish below; the irides are yellow; the feathers on the crown black, shot with green—those of the hinder part of the head, neck, and breast long and loose; the general colour of the plumage is dull pale yellow, variegated with spots and bars of black; the tail is short. The legs are long, and terminated by four long toes, the middle toe being serrated on the edge to assist the bird in grasping its prey.

The Little Bittern (*Ardea minuta*) is an inhabitant of South-western Asia, the south of Europe, and the whole continent of Africa. It occurs occasionally in Central and Northern Europe, and a good many specimens find their way into England, where they have sometimes been supposed to breed. It is about 13 inches in length.

BITTERS, a collective term applied to those vegetable substances the most prominent sensible quality of which is bitterness. "Bitterness," says Dr. Cullen, "is a simple perception that cannot be defined, but must be referred to a matter of experience in which mankind are commonly agreed. It was at one time attempted to refer this quality to an hypothetical principle, which was termed *bitter principle*; but it was soon perceived that substances having a bitter taste were indebted for it to very different sources. A certain quantity of bitter matter seems to promote the digestion of all food—hence bitter substances are found abundantly distributed in the vegetable kingdom. Where there is a deficiency of bitter matter, and the food is of a very watery kind such as grows in wet pastures, cattle are known to suffer from various diseases, especially from the rot.

Bitters are used as tonics in medicine, and may be advantageously employed by the inhabitants of cold and damp regions to prevent those diseases to which they are liable. Cold and moisture generally injure the function of digestion, both by their immediate action on the skin, and also, by abstracting the animal heat, on the nervous system—hence the prevalence of intermittent fevers or agues in such districts. These fevers may be warded off by maintaining a healthy action of the digestive organs and of the skin. Some preparation of a pure bitter, such as gentian, or of an aromatic and bitter united, such as camomile with sweet flag-root, or infusion of milfoil or yarrow, or the much more powerful and effective quinine, may be had recourse to for this purpose. The Swiss peasant, inhabiting high stations on the Alps, which are almost constantly wrapped in a thick and penetrating mist, uses a spirit distilled from gentian, called "bitter snaps." In the West Indies, where languor of the system, with weakness of the digestive organs, is produced by the excessive heat, the appetite is restored and the stomach invigorated by taking before dinner a few drops in a glass of water of an elixir made of gentian, serpentaria, orange-peel, and sweet flag-root; and in America the infusion or tincture of serpentaria is sometimes taken every morning in damp aguish situations to prevent intermittents. In phthisis pulmonalis bitters are sometimes of service, such as the bear-berry and the Iceland moss (*Cetraria Islandica*), in which the bitter principle should be retained. In some cases of diarrhoea from loss of tone of the intestines, bitters are of the greatest service, provided no inflammatory condition of the mucous membrane exists.

BITTER-SWEET (*Solanum dulcamara*) is a British perennial climbing plant common in wet and shady places, especially hedges. This plant is called Woody Nightshade, to distinguish it from the *Atropa belladonna*, or Deadly Nightshade. The young twigs or tops are officinal, and they should be gathered in spring, before the flowering of the plant, or in autumn while the leaves are yet fresh, as much activity seems to belong to the leaves; the twigs are best from plants about three years old. When fresh the plant has an unpleasant odour, which is in a great measure lost by drying, as is also a large portion of water. The taste is at first bitter, and slightly acrid, then sweet; hence the name Bitter-sweet given to it.

This plant differs from the Black Nightshade (*Solanum nigrum*) in its berries being red instead of black. Its upper leaves also are hastate, and its flowers purple.

BITUMINOUS COAL is a variety of COAL containing from about 25 to 50 per cent. of volatile matter, but does not contain any actual bitumen. It softens when heated, so that adjacent pieces coalesce and cake; it burns with a strong luminous flame, and is the coal in most common use for household purposes. The highly bituminous coals are used for the manufacture of gas.

BITUMINOUS SHALE, CARBONACEOUS SHALE, a variety of SHALE largely impregnated with carbonaceous material, and which yields on heating mineral oils, &c. The pitch lake of Trinidad derives its asphalt, &c., from adjoining bituminous strata of Tertiary age. The bitumen in these rocks is supposed to be of organic origin, being derived partly from terrestrial and marine plants, and partly from animal remains by the escape of the more volatile constituents and atmospheric oxidation.

BIVALVES is a name sometimes applied to the two classes of Mollusca—Lamellibranchiata and Brachiopoda—which possess a shell composed of two valves. The name is also used in reference to the shell of the water-fleas—e.g. *Daphnia* and the *Cypis*—which is also found fossil in great abundance.

BIVOUAC is a term in military tactics derived from the German *büwache*, "a keeping watch." It was originally applied to the strong parties of cavalry which were posted beyond the lines of intrenchment in order to watch the motions of the enemy, and prevent any attempt to approach the army by surprise; and because the soldiers thus employed passed the night in the open air, the term was subsequently used to denote the condition of any body of troops when in the field and not regularly encamped under tents. In former times, when a position was to be occupied for several days, the men constructed huts with such materials as were at hand, or endeavoured to shelter themselves from wind and rain by means of boughs planted in the ground, or by boughs formed into a roof, according to circumstances; and in an extremely inclement season they were usually cantoned in such towns or villages as were in their neighbourhood. They then lighted their fires in the streets, in gardens, or in barns, certain spots having been previously appointed as alarm-posts, about which, on signals being given, the different corps could assemble in order to form the line of battle, and act immediately as circumstances should require. This method of encampment was adopted by the revolutionary armies of France, and was of great assistance in promoting that celerity of movement by which they were distinguished. It was found, however, to be dangerous to the health of the troops employed, and to lead to habits of plundering and insubordination, and shelter-tents of some form are always used by modern armies where their use is at all practicable.

BIXA is a genus of plants which give the name to the order BIXINÆ. The flowers have large contorted petals, and both stamens and pistils. The anthers open by two pores or short valves at the apex. The capsule is two-valved and the seeds straight.

Bixa Orellana is a small tree, a native of the Antilles and tropical America from Mexico to Brazil. From the pulp covering the seeds a dye-stuff is made called ANNATTO. At the time of the discovery of America this dye was used by the natives to colour their skins red. Plantations of this tree were common in Jamaica in the seventeenth century, and it was one of the first plants introduced from America to Africa and Asia. Roxburgh mentions it as thoroughly naturalized in India.

BIXINÆ is a small order of plants belonging to the division POLYPETALÆ. The petals, however, are sometimes wanting, and the stamens and pistils often occur in separate flowers. The ovules are attached at two or more places to

the sides of the one celled ovary. The embryo is straight or slightly curved in fleshy albumen. Amongst the genera composing this order are BIXA and FLACOURTIA.

BLACK ACTS (Scottish) are so named from being all printed in black letter. They consist chiefly of the Acts of the Scottish Parliament during the times of the first five Jameses, but also reach down to 1687. In English law the term is applied to 9 Geo. 1. c. 22, framed against the "Blacks," a band of lawless ruffians of that time.

BLACK ASSIZE, the name given to a fatal assize held in 1577 in the old town-hall of Oxford, situated at that time in the yard of the castle. From the account given in Anthony à Wood's "History and Antiquities of the University of Oxford," it appears that after judgment had been pronounced upon one Rowland Jencks, a book-binder, who was condemned to lose his ears for sedition, "there arose such an infectious damp, or breath, among the people," that many, including the judge, sheriff, undersheriff, several justices, and most of the jury, died within a few hours. The infection soon spread, and within five weeks 510 persons died from it. The distemper was doubtless a fever originating in the unwholesome condition of the gaol, but some regarded it as a judgment for the cruelty of the bookbinder's sentence.

BLACK BEETLE (*Periplaneta orientalis*) is, strictly speaking, not a beetle at all, but a COCKROACH. It belongs to the section CURSORIA of the order ORTHOPTERA. The fore wings of the black beetle are closely veined, and are much less thick and horny than those of the BEETLES (Coleoptera), and the hind wings, also closely veined, fold up like a fan. The black beetle also differs from the true beetles in that its pupal form is active, and resembles both the larval form and the perfect insect. The black beetle is generally regarded as a native of India, introduced into England in merchant vessels. They are much relished by the hedgehog, and this spine-covered animal is sometimes kept in kitchens to reduce their numbers. Black beetles are said to devour greedily the common bed bug.

BLACK DEATH, the name given to a terrible plague which overran and desolated most countries of the world during the fourteenth century. There is much that is obscure in the history of its rise and progress, but it is generally believed to have originated in China somewhere about the middle of the century. During the first half of that period the Chinese had suffered greatly from drought, famine, earthquake, and flood, and Europe had been troubled in a similar way, though in a lesser degree. In China the close of these troubles was marked by a terrible outbreak of plague, and the disease, travelling with the trading caravans which journeyed westward, reached Constantinople in 1348. Thence it spread to Italy, and then passed through Germany and France to England. It passed through England and Scotland on to Sweden and Norway, and thence to Russia, its path everywhere being marked by the most awful suffering and desolation. It is not at all clear by what means the infection was propagated, but it was generally believed at the time that it was conveyed in the air; and writers of the period speak of a visible appearance resembling a mist or fog which passed along, bearing death and destruction everywhere. The symptoms of the complaint have been more minutely described, and they appear to have taken the form, in the first instance, of a carbuncular affection of the lungs, attended by acute pains in the chest, spitting of blood, and an ardent fever, which generally proved fatal in periods varying from twelve hours to three days. As the disease progressed it became changed somewhat in its form, and the persons attacked suffered also from buboes on the arms and thighs, black spots all over the body, a black palsied tongue, intense thirst, and insensibility. The medical science of the time knew of no remedy, and in most instances the appearance of the plague-spot was the herald

of death in a few hours. It is impossible to form any exact estimate of the mortality caused by this plague, but it has been computed that in Asia it caused the death of 87,000,000 people, and in Europe of 25,000,000. It is supposed that of the population of Europe one out of every four perished, though the rate of mortality varied greatly in different countries, from 50 per cent. in Italy to 10 per cent. in France. The estimates given by the old writers concerning the rate of mortality in Great Britain are not to be relied on, but London alone lost over 100,000, and one chronicler declares that Scotland lost a third of its people. It was even conveyed to Iceland, and some have supposed that the mysterious disappearance of the Norwegian settlements on the shores of Greenland is to be attributed to this cause. Of the horrors of this period it is impossible to form any conception. The most vivid imagination would fail to portray the consequences to the survivors of the death of such enormous numbers, and under circumstances so awful. The ties of family life and the bonds of society were for a time almost dissolved, and the people, deserted by rulers, priests, and doctors, became the prey of the wildest terror and most furious fanaticism. Rumours of the most extravagant kind gained ready credence, and some of them were attended with terrible consequences. Thus a report which was circulated, to the effect that the plague had been caused by the Jews, who had poisoned the wells and fountains of water, led to the most awful excesses. Some of these unhappy people, being subjected to terrible tortures, pleaded guilty to any charge that was put into their mouth, and the people then rose in fury, bent upon exterminating the whole race. In Mainz alone 12,000 were put to death by the populace. In many places the Jews, threatened with death by fire and torture, killed one another, and thus became utterly extinct as communities. Robbers also roamed at will through the cities, and plundered and murdered with impunity, adding by their lawless desperation to the sufferings which prevailed. Many died of sheer terror alone, and many on the first symptoms of illness committed suicide. The best account of this period is to be found in the prologue to the "De cameron" of Boccaccio, though there are also good descriptions by the physicians Gny de Chauliac, who observed it at Avignon, and by Chalm de Vinaris. See also the description given in Bulwer's "Rienzi," and Hecker's "Epidemics of the Middle Ages."

BLACK or DOMINICAN FRIARS, an order of mendicant friars founded by St. Dominic, a Spaniard, born at Calagorraga, a small town in the diocese of Osma in Old Castile, about A.D. 1170. His real name was Dominic de Guzman. He died in 1221, and was canonized by Pope Gregory IX. in 1235. These friars were called Dominicans from their founder: Preaching Friars, from their office to preach and to convert Jews and heretics; Black Friars, from the colour of their garments; and in France Jacobins, from having had their first house in the Rue St. Jacques at Paris. There were also nuns of this order.

BLACK FOREST (*Schwarzwald*). See BADEN.

BLACK HOLE OF CALCUTTA. On the taking of Calcutta by Rajah al Dowlah on the 18th of June, 1756, Mr. Houlwell and 145 of his fellow-countrymen were thrust into the common dungeon of Fort William, usually called the *Black Hole*. These unfortunate men were condemned to pass the night, in one of the hottest climates of the world, and at the hot season, in a dungeon only 18 feet square. The only air they received was through two small gratings, almost entirely blocked up by the neighbouring buildings. A fearful scene ensued—the wretched captives struggling one against the other to obtain a station near the narrow aperture. When the door was opened on the following morning only twenty-three were found alive out of the 146 that had been thrust in the night before. At this juncture the affairs of the English in Bengal had reached the lowest

ebb, but on the 1st of January in the ensuing year Calcutta was retaken by Watson and Clive, and Rajah al Dowlah compelled to sign a treaty of peace. He was afterwards defeated at the battle of Plassy, and put to death by a native officer.

BLACK, JOSEPH, was born in France, on the banks of the Garonne, in the year 1728. His father and mother were of Scotch descent. Having chosen the profession of medicine, he went to complete his medical studies in Edinburgh in 1750 or 1751, having previously had the advantage of attending Dr. Cullen's lectures on chemistry at Glasgow. This science, in which he was destined to act so important a part, strongly excited his attention, and he pursued it experimentally with great vigour and commensurate success.

The chemical subject which seems first peculiarly to have excited his attention was the causticity of lime, a property till then supposed to be due to the absorption by the lime of some igneous agency. He placed the question on a scientific basis by ascertaining the chemical difference between quicklime and other forms of the carbonate. Black wrote an inaugural thesis on the subject in 1754, and a treatise in 1755. In 1756 he was appointed professor of anatomy and lecturer on chemistry in the University of Glasgow, where he continued till 1766, when he was appointed to the chemical chair in Edinburgh. Between the years 1759 and 1763 he matured the speculations on heat which had for a long period occasionally occupied his thoughts. Berthollet has recorded an observation made by Fahrenheit, that water would become considerably colder than melting snow without freezing, and would freeze in a moment if disturbed, and in the act of freezing emitted many degrees of heat. This subject was further and more fully investigated by Dr. Black, and he finally propounded as the result of his inquiries the theory of *latent heat*. It was this discovery which mainly urged Watt to the adoption of improved arrangements in the steam engine. Dr. Black died 26th November, 1799, in his seventy-first year.

BLACK LEAD. [See PLUMBAGO.] The term is usually restricted to the manufactured GRAPHITE, as used in the arts for polishing iron, &c.

BLACK LETTER (♠), the name usually given in England to those types of the earliest printed books which are commonly known on the Continent as Gothic. The Roman letters, which came generally into use during the fifth century, maintained their ground until the close of the twelfth century, when they began to give way in Western Europe to those known as Gothic, and which remained in use until the sixteenth century. The earliest printed books were prepared in imitation of the written manuscripts, and many were sold in the first instance as hand-written books. Most of the books printed before the sixteenth century were in black letter, but after that period the Roman character came again into favour, and the Gothic characters passed gradually out of use. Books printed in black letter are highly prized, on account of their rarity and antiquity, by book-hunters and bibliomaniaes. In Germany the Gothic characters are still generally employed in printing, but the Roman characters are used more and more every year. The complete introduction of the latter is only hindered by a pseudo-patriotic feeling, such as the French nickname "chauvinism." Thus Prince Bismarck declared that German in Roman type gave him as much difficulty to read as a foreign language. Meanwhile almost every educated German beyond boyhood wears spectacles.

BLACK LIST, a name familiarly applied to certain printed lists of bankruptcies, liquidations by arrangement, registers of protested bills, decrees in absence, offers of composition, and other matters relating to the credit of firms and individuals, which are circulated for the guidance of men of business. Most of them are prepared in London, and are issued only to subscribers.

BLACK MONDAY was that terrible day of darkness, hail, wind, and storm which carried off a large part of the

army of Edward III. on Easter Monday, 1360, as he lay before Paris, making so terrible an impression on the nation that Easter Monday long went by this unfavourable name. Thus Shakspeare speaks of "Black Monday" ("Merchant of Venice," Act ii. scene 5). **BLACK MONDAY** is also an evil memory of the colony of Victoria. On Monday, 27th February, 1865, a fearful sirocco produced dreadful havoc between Sandhurst and Castlemaine. **BLACK THURSDAY** is another Australian memory, also of the colony of Victoria, where on Thursday, 6th February, 1851, a terrible bush-fire devastated the young colony. **BLACK FRIDAY** commemorates the Friday, 6th of December, 1745, when London was driven frantic by the news that the Pretender was at Derby, and frightful excesses occurred amongst the panic-stricken citizens. But a newer **BLACK FRIDAY** is that long remembered day in London financial circles when the house of Overend, Gurney, & Co. stopped payment (11th May, 1866), and half the banks in London trembled for their safety. **BLACK SATURDAY** (4th August, 1621) was for over a century celebrated in Scotland, a great storm being supposed to indicate the divine wrath on the Parliament which assembled then to enforce Episcopacy on the unwilling people. **BLACK BARTHOLOMEW** is not, as sometimes thought, so named after the horrible massacre in Paris on St. Bartholomew's Day in 1572, but after the day on which the Act of Uniformity of Charles II. came into operation (St. Bartholomew's Day, 24th August, 1662), when 2000 of the Puritan clergy in one day resigned their cures, and amidst every sort of privation and misery created a force until then unknown in England—the power of Nonconformity in religion. Thus originated the first of the various bodies not belonging to the Established Church of England which are now, for convenience sake, grouped together as "Nonconformists" or "Dissenters."

BLACK PRINCE, THE, Edward, Prince of Wales (father of Richard II.), died about a year before his father, King Edward III., and therefore never succeeded to the throne. His well-known sobriquet was gained in the French war—probably at Crécy, when as a youth of seventeen he led the grand charge of the English and secured the victory, to the undisguised admiration of his father. He steadily refused to send him any assistance, even when at one time the prince was very hard pressed, in order that he might have the full glory of the day. It is generally said that the "Black Prince," a term of terror amongst the French, was given to Prince Edward on account of the colour of the armour which he wore at Crécy; but there seems no authority for this tradition. Froissart specially says "he was called black by the terror of his arms;" and Strutt ("Antiquities") gives the same account. That is, the words "Black Prince" would be equivalent to "Prince of Darkness"—prince of supernatural and irresistible, perhaps Satanic power. It is admitted that the appellation was French in origin. Meyrick, the great authority on armour, doubts if ever Prince Edward wore black armour in his life, and all known representations of him are clad in armour wholly or in part *gilt*. See Shaw, Stothard, &c.

BLACK ROD, USHER OF THE, is an officer of the House of Lords. He is styled the Gentleman Usher of the Black Rod, and is appointed by letters patent from the crown. His deputy is styled the Yeoman Usher. They are the official messengers of the Lords, and summon the Commons to the House of Lords when the royal assent is given to bills. "He executes orders for the commitment of parties guilty of breaches of privilege and contempt, and assists at the introduction of peers and other ceremonies" (May's "Parliament," p. 156).

BLACK ROD OF SCOTLAND. This was a small silver-gilt casket, wrought in the form of a cross, containing an ebony figure of Christ, in which was embedded a morsel of wood supposed to be a fragment of the true cross. It was brought to Scotland by Margaret, sister of the

Anglo-Saxon king, Edgar the Atheling, about 1070. She became the wife of the Scottish king, Malcolm Ceanmohr, and at her death bequeathed the relic as a sacred heirloom to her children to be retained for ever. It was held in the highest reverence by the Scotch people, and was kept with the royal regalia and national muniments in Edinburgh Castle. It was surrendered to Edward I. in 1291, and he employed it in taking the oaths of fealty tendered by those Scotch magnates who submitted to him. At the peace of Northampton in 1328 it was restored to Scotland, but it only remained there eighteen years. In 1346 the Scotch king, David II., carried it with him on his invasion of England, and after his defeat at the battle of Neville's Cross it became the prize of Sir Ralph de Neville, lord of Raby. It was placed by him in the shrine of St. Cuthbert in the Cathedral of Durham, where it remained until the Reformation. Its after history is unknown.

BLACK SEA (so called because of its dark waters) divides the southern provinces of Russia from Anatolia or Asia Minor, and extends in length nearly 700 miles between 28° and 41° 30' E. lon., and 41° and 46° 40' N. lat. Its breadth on the W., between the mouth of the Dnieper and the opposite shore near the Bosphorus, is nearly 400 miles; in the middle, where it is narrowed by the projecting peninsula of the Crimea, the narrowest part hardly exceeds 160 miles, but further E. it enlarges again to 300 miles, which width, however, decreases towards its eastern extremity. The space which it occupies is calculated by German geographers at upwards of 180,000 English square miles, and is therefore larger than the Baltic. It is connected with the Sea of Azof by the Straits of Yenikale or of Kaffa, and with the Archipelago and the Mediterranean by the Bosphorus, the Sea of Marmora, and the Straits of the Dardanelles. The straits of the Black Sea are very remarkable; they scarcely break the continuity of the land, for at their narrowest part, that of Yenikale is not more than 2 miles across, and that of Constantinople less than $\frac{1}{2}$ mile. The former, indeed, spreads out in low and swampy grounds into a kind of marshy bay, the greatest width of which, measured transversely, is about 34 miles; but the Thracian Bosphorus flows through its whole length of about 17 miles, like a magnificent river, between mountainous banks, and in no part attains a width of more than 2 or $2\frac{1}{2}$ miles. The Greeks first called this sea *Axine*, "inhospitable;" but fearful of thus offending the gods they altered the name to *Euxine*, "hospitable."

With the exception of the Hoang-Hai (or Yellow Sea) of China, there is probably no portion of the ocean which receives the drainage of a greater extent of country than the Black Sea. About 860,000 square miles of European territory are drained by rivers which empty themselves into the Black Sea, such as the Danube, the Dnieper, &c.; while an area of Asia amounting to about 100,000 square miles is similarly drained by other rivers. The specific gravity of its water is about 1.142; it is less salt than that of the Atlantic (1.288), but saltier than that of the Baltic (1.040).

The shores of the Euxine present a very varied aspect. From the Bosphorus eastward the coast is rather low as far as Cape Baba, though the hills are never far from the coast. From Cape Baba to the mouth of the Kizil Ernak, the highlands advance close to the shore; then follows a low shore, which extends as far as Cape Yasoun (the Jasonium of the Greek geographers), the formation of which is ascribed to the alluvions of the three rivers, the Kizil Ernak, the Casalnak, and the Tharmeh, which empty themselves into the sea within these limits. To the east of Cape Yasoun the coast is alternately low and high. Between Kaffa and Sebastopol the mountains press close upon the shore. The remainder of the shore, as far as the mouth of the Danube, is low and sandy, and continues so to Mangalia (about 44° N. lat.), north of Cape Shabla, where the

western offsets of the Balkan Mountains approach the sea. Here the shore becomes rocky, but does not rise so high as between the port of Varna and Cape Eminéh. South of this cape the rocky shore continues to the straits of Constantinople, but rises to a moderate height only in a few places.

The navigation of the Black Sea is neither difficult nor dangerous; it is almost entirely free from islands and rocks. In its whole extent there is only one small island, called Ilan Adassi, uninhabited, and lying under $45^{\circ} 15' N.$ lat. at a considerable distance from the western shore. Rocks never occur except near Cape Kerpen, about 60 miles E. of the Bosphorus; nor are shoals frequent. The Black Sea is deep, the bottom of it not having been found by lines of 120 and 140 fathoms, except towards the coast, where at a distance of 2 or 3 miles it varies from 20 to 30 fathoms, and in many places, as off the mouth of the Danube, the soundings decrease so gradually and exactly, that the distance from the shore may be known by soundings within half a mile.

Storms are not uncommon, but they are never of long duration. The sea is, however, short and troublesome, more especially about the entrance of the channel of Constantinople. In summer the prevailing winds blow from N.E. and N., but in the sea these winds are more variable than in the channel itself, where they are almost constant during the whole summer, and ships sometimes lie here wind-bound for three months. These northern or north-eastern winds extend as far as the island of Tenedos in the Archipelago. In autumn, winter, and spring the winds are often southerly and various. Another disadvantage to navigation arises from some of the northern ports being frozen up from the end of December or the beginning of January, to the end of February or the beginning of March. This is always the case with the ports between the Crimea and Odessa.

By far the greatest quantity of water is received by the Black Sea at its north western corner, where the Dnieper, Bug, Dniester, and Danube fall into it. Most of the countries through which these rivers run are covered for three or four months of the year with snow; and in spring-time all the moisture which has descended on them during the winter, and has been preserved in a solid state, suddenly dissolves and descends in the channels of the rivers with great velocity and in immense volume. It then produces a very rapid current along the western shores from the mouth of the Dnieper to the channel of Constantinople; this current always exists, and is strong, especially in summer, during the prevalence of the northern and north-eastern winds. The accumulation of the waters towards the Straits of Constantinople is so great that the Bosphorus is not able to carry off all of it, and a portion is pressed against the coast of Anatolia, where it gives rise to another current running eastwards. Indeed, it seems that a current runs round the whole of the Black Sea at no great distance from the shore.

Harbours are numerous, and many of them good. The principal are Burgas and Varna, south of the mouth of the Danube; Kilia, on the northern arm of that river; Akhmeran or Akerman, on the estuary or Liman of the Dniester; Odessa, Oczakow, Nicolaief, Cherson, and Kinburn, on the Bug and Dnieper, and their common estuary; in the Crimea, Eupatoria or Kioslow, Sebastopol, Balaklava, and Caffa. The harbours round the eastern shore, as Anakria, Kapi, Poti, Batumi, are not visited. On the coast of Anatolia are the harbours of Rize, Trebizond, Tereboli, Kerasun, Samsun, Sinope, Iueboli, Ereklí, and Kerpen.

The Euxine teems with seals, porpoises, sturgeons, dolphins, mackerel, mullet, bream, and other fish, mostly of the same kind as those caught in the Caspian and Sea of Aral. There are, however, few fisheries established along its shores, though where they do exist they are extremely productive.

The Black Sea was navigated at an early period by the

Greeks. The discovery of the channel which leads to it from the Archipelago is probably indicated by the fable of Helle and Phrixus; and the first voyage to it, in the expedition of Jason. It is not unlikely that some dispute respecting the free navigation of the Black Sea gave rise to the Trojan War, because Ilium was so situated that it could hinder vessels from entering the Straits of the Dardanelles. At a later period the Greeks, and more especially the Ionian Greeks of Miletus, formed numerous establishments along its shores, from which they exported slaves, cattle, and corn, in great quantities. The shores of the Euxine were pretty well known to the Romans. In the times of the Byzantine emperors, Constantinople drew from it a considerable part of its provision; and in the twelfth century the Genoese formed some establishments on its north-eastern coast, and carried on a very active commerce overland with India. From the fifteenth to the latter part of the eighteenth century, the Turks excluded every other nation from its waters. At length the Russians fought their way to its shores, and in 1799 it was partially opened to British and other European traders. Conventions to the same effect were made with the Turkish government by Queen Elizabeth, James I., and Charles I., &c. (treaty of Adrianople, September, 1675), but they seem to have been without any effect; and it is only, therefore, since the later date, or from the beginning of the present century, that the Black Sea has become known to, and been justly appreciated by navigators.

By the treaty of peace signed at Paris after the Crimean War, 30th March, 1856, the Black Sea was neutralized, and the Emperor of Russia and the Sultan engaged not to establish or to maintain upon its coasts any maritime arsenal. The latter stipulation was, however, always distasteful to Russia, and in 1870, whilst war was raging between Germany and France, she gave notice that she no longer considered herself bound by it. At one time a rupture with England on the subject seemed imminent; but a conference was held at London early in the following year, and an arrangement was come to, under which the restrictions which had been placed on both Russia and Turkey were removed.

BLACK SNAKE (*Bascanium constrictor*) is a large innocuous snake, belonging to the same family as the COBBER. It has a slender body, black above, and of a leaden hue below; the throat is white. It has no poison fangs, but great powers of constriction. These snakes are very agile, moving along the ground with great swiftness, and climbing trees with ease in search of birds, of which they are very fond. They also feed on small mammals and frogs. The black snake wages unceasing warfare with the rattlesnake, enveloping the latter in its folds, crushing it to death, and then eating it. This snake is common in North America.

BLACK WATCH. The regimental name of the former 42nd Regiment of the British army—now known as the "Royal Highlanders." It was originally given about 1730 to six companies of militia raised among the Whig clans of Scotland for the purpose of maintaining order on the Lowland frontier, and of overawing the Highland adherents of the house of Stuart. In 1749 the companies, which had been previously independent, were united into one regiment, the Earl of Crawford and Lindsay being appointed colonel. A dark tartan of an arbitrary pattern was adopted for the uniform, which was afterwards known as the Black Watch or 42nd tartan. The subsequent history of the regiment has been of a brilliant character, the record of which furnishes a stirring narrative of military courage, endurance, and adventure, and it still retains the distinction of being one of the crack regiments of the British army. Its advance on Coomassie during the Ashantee war, and its brilliant services in Egypt and in the Soudan in 1882-85 will be long remembered.

BLACK BAND is an argillaceous carbonate of iron or clay ironstone containing a large proportion of carbonaceous matter. It is a most valuable iron ore, and occurs in the upper coal measures of Lanarkshire, also in South Wales and Staffordshire, and in Ireland in the Rosecommon coal-field.

BLACK BERRY. See RUBUS.

BLACK BIRD (*Turdus merula*) is a species of THRUSH, and is a permanent resident in Britain and in the southern parts of Europe, but migrates for the winter from the more northern regions.

The blackbird is shy and reclusive, frequenting hedgerows, thickets, shrubberies, and large gardens. When disturbed or surprised it escapes into the covert or dense foliage, uttering a loud sharp cry of alarm. Its song is clear, sweet, and melodious; and in captivity it may be taught to whistle tunes. Like the thrush, it feeds upon slugs, shelled snails, worms, and insects, and also upon currants, cherries, peas, &c., often making much havoc in the garden, as indeed does the thrush; but both compensate for this by their destruction of snails and slugs, and by their melody.

Early in spring the blackbird begins its nest; a thickset hedgerow, an insulated bush of some evergreen, or a bower of ivy, are favourite places. Shy as it is, it often builds its nest where persons are continually passing to and fro, and there the female will sit undisturbed by their presence or their gaze. The outer framework of the nest consists of moss, small sticks, grasses, and fibres; there is an inner coat of mud plaster, and within this a lining of fine dry grass. The eggs, four or five in number, are of a bluish green, variegated with darker markings. Two broods are generally hatched and reared during the spring and summer. The female blackbird is of a brownish black above, the breast being pale amber brown. The bill and legs are blackish brown. The young are similar to the females, and the males do not acquire their glossy black and orange-yellow bill till after the second moult. White and cream-white varieties (albinoes, in fact) are sometimes met with.

BLACKBURN, a market-town and municipal and parliamentary borough in Lancashire, on the Lancashire and Yorkshire Railway, is 214 miles N.W. by N. from London, and 23 miles N.N.W. from Manchester. Dr. Whitaker in his "History" states that there was a castle at Blackburn occupied by British chiefs, and subsequently by Saxons, but no vestige of it remains. Camden speaks of Blackburn as a noted "market town;" while Bloom's account, nearly a century later, describes it as having "a great weekly market for cattle, corn, and provisions, on the Monday."

The town of Blackburn is situated on the bank of a brook, called in Domesday Book "Blacheburne," but which has now no particular name. It was formerly irregularly built, and the streets very badly paved or not paved at all; but the town has been very greatly improved in every respect in recent years. It suffered severely during the cotton famine; but as in the case of many other places in Lancashire, in the end this disaster proved a great benefit, as several much-needed improvements were carried out—especially those connected with sanitary matters, and in the paving and widening of streets. The public park, which is 50 acres in extent, was also tastefully laid out—the work being done, as far as possible, by the unemployed operatives. The water-works, which had been previously commenced, were completed at the same time, and there is now a good supply, the reservoir at Fish Naze being capable of containing 360,000,000 gallons. In 1871-72 a most extensive scheme for the irrigation and utilization of the town sewage was carried into effect at a cost of between £200,000 and £300,000.

The town of Blackburn depends entirely on trade for its prosperity. As far back as 1650, one particular article of the staple trade of the county was produced here with better success than in any other place, to which was given the name of "Blackburn checks," a species of cloth consisting

of a linen warp and a cotton wool, one or both of which being dyed in the thread, gave to the piece when woven a striped or checked appearance. This fabric was afterwards superseded by another, "the Blackburn grays," so called because the materials of which it was composed were not dyed, but sent to the printers unbleached, or, as it is technically described, in the gray state, in order to have the patterns stamped upon them. Cotton goods are now the chief articles made in Blackburn, but there are some manufactures of woollens, and some large iron-foundries and engineering establishments. Coal-mines are extensively worked in the neighbourhood, and also some freestone quarries.

The parish church, St. Mary's, is of very ancient foundation, but was altered and decorated in 1857, and is much admired for its architectural beauty. Besides St. Mary's, there are several other churches belonging to the Establishment, and places of worship for all denominations of dissenters, and a grammar-school founded by Queen Elizabeth. The Town-hall, which was completed in 1856, is a handsome building in the Italian style. It contains the usual rooms for municipal purposes, and a large room for public meetings, capable of containing 1200 persons. The Exchange, opposite the Town-hall, was built in 1865. In addition to its business purpose, the large room is used for meetings and concerts, and contains a large orchestra. Amongst the other buildings are a county court, free library and arts gallery, erected in 1875; Reform and Conservative club-houses, both new and handsome buildings; and close to the town is the Blackburn Infirmary, built on the pavilion principle of separate blocks of buildings, and arranged on the best sanitary principles. Several banks, offices, warehouses, and shops, erected within the last ten years, add much to the appearance of the town.

James Hargreaves, a native of the town, invented the spinning jenny in 1767. He was driven out of the country, and it was more than forty years before his native place followed in the track of improvement introduced by his invention.

The parliamentary borough of Blackburn returns two members to the House of Commons. The population in 1881 was 100,618; and the number of electors in 1883, was 14,181. Population of the parish, 91,958.

BLACK-CAP (*Curruca atricapilla*) belongs to the family Sylviidae, of the order PASSERES. This charming songster, the rival of the nightingale, arrives in our island in the middle of April, and leaves in September. It has



Black cap (*Curruca atricapilla*).

an extensive geographical distribution, reaching as far north as Norway and Lapland, and being found also in Africa, the Azores, and some parts of Asia. It is almost unknown in Ireland.

"The black-cap," says White in his "Natural History of Selborne," "has in common a full, sweet, deep, loud, and wild pipe; yet that strain is of short continuance, and his motions are desultory, but when that bird sits calmly and engages in song in earnest, he pours forth very sweet

but inward melody, and expresses great variety of soft and gentle modulations, superior, perhaps, to those of any of our warblers, the nightingale excepted. While they wobble their throats are wonderfully distended."

When the black-cap "first arrives in this country, its chief food is the early-ripened berries of the ivy, and where those are there the black-caps are first to be heard singing their melodious and varied song. By the time the ivy berries are over, the little green larvae of the small moths will be getting plentiful, rolled up in the young shoots and leaves; this then is their chief food until the strawberries and cherries become ripe. After that there is no want of fruit or berries till their return, and there is no sort of fruit or berry, eatable and wholesome, that they will refuse. After they have cleared the elder-berries in autumn, they immediately leave us." (Sweet.)

Woods, thickets, orchards, &c., are the favourite haunts of this species, and there, amongst dense brushwood or brambles, it builds its nest. Dry stalks, goose grass, a little wool, lined with fibrous roots, and frequently with a few long hairs, and now and then a little moss on the outside, form the structure. The eggs are five in number, of a reddish brown, with spots of a darker tint, intermixed with others of ashy gray. The male black-cap measures nearly 6 inches in length; the crown of the head is black, the neck and breast gray, the upper parts gray with a greenish tinge. In the female, which exceeds the male in size, the crown of the head is amber brown; and the general tints of the plumage are darker.

In a state of captivity the black-cap is a great favourite, not only from its song, but also from its familiarity and other attractive qualities.

BLACK-COCK (*Tetrao tetrix*) is one of the English names for the male bird of a species of GROUSE. The female is called a *gray-hen*, and the young are named *poult*s, a term which is applied to the black game generally on the borders of Hampshire and Dorsetshire.

This noble bird, whose plumage when in full beauty has defied all pencils, save that of Edwin Landseer—the only painter who has given a true idea of it—is now the largest of its race in the British Islands, of whose fauna it is one of the principal ornaments. It is more widely diffused over the central parts of Europe than the CAPERCAILLIE. In Germany, France, and Holland, it is tolerably plentiful; in the northern countries, such as Denmark, Sweden, Norway, and Russia, it abounds.

Of the southern counties of England, Hampshire, Dorsetshire, Somersetshire, and Devonshire possess it, and now and then it is seen in the heathy parts of Sussex and Surrey. In the New Forest and the wild heaths on the borders of Hampshire and Dorsetshire, in the neighbourhood of Wimborne, it is perhaps more common than it is anywhere else in the south. The Quantocks, Sedgemoor, and some other uncultivated tracts in Somersetshire, and Dartmoor in Devonshire, are its headquarters in those counties; but it is comparatively rare. Staffordshire has it sparingly, and Northumberland plentifully.

In the Highlands of Scotland the black-cock is abundant, and it is found in some of the Hebrides. In North Wales it occurs sparingly, and is strictly preserved. Pennant says that some had been shot in Ireland, in the county of Sligo, where the breed was formerly introduced out of Scotland, but expresses his belief that, at the time he wrote, they were all exterminated. They languish in confinement, and all attempts to domesticate them have failed.

Selby gives the following account of the haunts and habits of the black-cock in a state of nature:—

"The bases of the hills in heathy and mountainous districts, which are covered with a natural growth of birch, alder, and willow, and intersected by morasses clothed with long and coarse herbage, as well as the deep and wooded glens so frequently occurring in extensive wastes,

are the situations best suited to the habits of these birds, and most favourable to their increase. During the months of autumn and winter the males associate, and live in flocks, but separate in March or April; and, being polygamous, each individual chooses some particular station, from whence he drives all intruders, and for the possession of which, when they are numerous, desperate contests often take place. At this station he continues every morning, during the pairing season (beginning at daybreak) to repeat his call of invitation to the other sex, displaying a variety of attitudes, not unlike those of a turkey cock, accompanied by a crowing note, and one similar to the noise made by the whetting of a scythe. At this season his plumage exhibits the richest glosses, and the red skin of his eyebrows assumes a superior intensity of colour. With the cause that urged their temporary separation their animosity ceases, and the male birds again associate, and live harmoniously together. The female deposits her eggs in May; they are from six to ten in number, of a yellowish-gray colour, blotched with reddish brown. The nest is of most artless construction, being composed of a few dried stems of grass placed on the ground, under the shelter of a tall tuft or low bush, and generally in marshy spots where long and coarse grasses abound. The young of both sexes at first resemble each other, and their plumage is that of the hen with whom they continue till the autumnal moult takes place; and at this time the males acquire the garb of the adult bird, and quitting their female parent, join the societies of their own sex. The food of the black grouse, during the summer, chiefly consists of the seeds of some species of *Juncus*, the tender shoots of heath, and insects. In autumn, the crowberry or crawlerook (*Empetrum nigrum*), the cranberry (*Vaccinium oxycoccos*), the wortleberry (*Vaccinium vitis idæa*), and the trailing arbutus (*Arbutus uva ursi*), afford it a plentiful subsistence.



Black-cock (male).

In winter, and during severe and snowy weather, it eats the tops and buds of the birch and alder, as well as the embryo shoots of the fir tribe, which it is well enabled to obtain, as it is capable of perching upon trees without difficulty. At this season of the year, in situations where arable land is interspersed with the wild tracts it inhabits, descending into the stubble grounds, it feeds on grain."

The flesh of the black-grouse is much esteemed. The different colour of the flesh of the pectoral muscles must have struck every one. The internal layer, which is remarkably white, is esteemed the most delicate portion. Belon goes so far as to say that the three pectoral muscles have three different flavours; the first that of beef, the next that of partridge, and the third that of pheasant.

The male differs in many respects from the female. It is about 4 lbs. in weight. The bill is dusky black, the irides hazel; the head, neck, breast, back, and rump glossy black, shot with steel-blue and purple; the eye-brows naked, granulated, and of a bright vermilion red; the belly, wing-coverts, and tail, pitch black; the secondaries tipped with pure white, and forming with the neighbouring coverts a band across each wing; the under tail-coverts pure white; the legs are furnished with hair-like feathers of a dark brown, speckled with gray; the toes are pediculated; the tail is black—the exterior feathers bent outwards, and much longer than those in the middle—an arrangement which gives the singular curvature and fork shape to the tail of the bird.

The female, or gray-hen, weighs about 2 lbs. The colour of the plumage is rusty brown, barred and mottled with black above, paler below, with dusky and brown bars; the under tail-coverts are white, streaked with black; the tail is orange brown, speckled with black, showing a slight disposition to be forked, tipped with grayish white.

No person is permitted to kill, destroy, carry, sell, buy, or have in his possession any heath-fowl, commonly called black-game, between the 10th of December and 20th of



Black-cock (female).

* August, except in the New Forest, Somerset, and Devon, where the limitation is from the 10th of December to the 1st of September.

Hybrids between the gray-hen and male pheasant have been known to occur, and the Scandinavian bird (*Tetrao hybridus*) is probably a cross between the capercaillie and the gray-hen.

BLACK FRIARS' BRIDGE, one of the bridges over the Thames in London, was so named from having been built near the spot where a monastery of Dominicans had formerly existed. It was completed in 1770, at a cost of £800,000. The bridge lasted till 1866, when, having become unsafe, it was taken down, and a very handsome structure of iron on granite piers erected in its place, which was opened by her Majesty in 1869. It consists of five arches, and is 75 feet wide and 1272 feet long.

BLACKHEATH, an elevated district of Kent, 6 miles from London by the South-eastern line, is chiefly known as a favourite resort for pleasure parties from the metropolis in summer time; but the beauty of the heath has been greatly injured by the Commissioners of Woods and Forests permitting sand excavations upon it. A Roman road (Walling Street), from London to Dover, traverses the heath, nearly in the direction of the modern line; there are some large ancient tumuli on it. In the eleventh century the Danes (whose fleet lay off Greenwich) were encamped on the heath some months, whence they made many ex-

cursions, in one of which Canterbury was sacked, and the archbishop carried off and afterwards killed. Then came the encampment of masses of people during three successive rebellions, viz. Wat Tyler, 1381; Jack Cade, 1450; and of the Cornishmen under Lord Audley, 1497; while in more peaceful times, the common was the usual rendezvous for the reception of illustrious visitors, such as Cardinal Campeius, the pope's legate, 1519; Anne of Cleves, 1539; and Charles II., 1660. The heath is now under the control of the Board of Works. The northern boundary is marked by the wall of Greenwich Park, through which the visitor can make his way to the river side. Blackheath is a pleasant and fast extending suburb of London, easy of access by rail for those who like to escape from the bustle of city life.

BLACK'ING, an article used for polishing black leather, and especially the upper leathers of boots and shoes. It is prepared in various ways, but the best blacking consists of a combination of bone-black ground with sperm oil, and mixed with raw sugar or molasses and a little sulphuric acid. The action of the latter is to convert a large portion of the lime in the bone-black into sulphate of lime, causing the mixture to thicken into a stiff paste. This, while still warm, is diluted with vinegar and water, and is then bottled for sale. The cheaper kinds of blacking are generally sold in the form of cakes of stiff paste, the moisture being retained by a kind of oiled or waterproof paper.

BLACK-MAIL is the name given to certain contributions formerly paid by landed proprietors and farmers in the neighbourhood of the Highlands of Scotland, of the English and Scottish border, and of other places subjected to the inroads of "rieverers," or persons who stole cattle on a large scale. It was paid sometimes to a neighbouring chief, who engaged to keep the property free from depredation, and frequently to the depredators themselves as a compromise. Spelman attributes the term black to the circumstance of the impost being paid in copper money, and he is followed by DuRoi. Dr. Jamieson, in his "Etymological Dictionary," thinks the word was intended simply to designate the moral hue of the transaction. The word mail (from Anglo-Saxon *mal*, rent-tax) was used in Scotland to express every description of periodical payment, and it is still a technical term in the law of landlord and tenant.

BLACK'POOL is a much frequented sea bathing place of Lancashire, situated on a lofty bank on the coast of the Irish Sea, 229 miles from London, and about 20 miles W. of Preston. A very handsome pier, which cost £20,000, was built in 1868, and in 1870 a sea-side promenade was opened, the cost of which was £80,000. From it is obtained an uninterrupted view of the open sea, with the Westmoreland and Cumberland mountains to the right, and the more distant mountains of North Wales to the left. A very fine pavilion on the pier was opened in 1877; the winter gardens and aquarium, which involved an expenditure of £100,000, in 1878; and the free library in 1880. The town has of late years much increased, and upwards of 100,000 visitors now arrive annually. The sands are excellent. In 1874 the corporation purchased Raikes Park for £14,000, and transformed it into a public park. The population is 14,229.

BLACKSTONE, WILLIAM, author of "Commentaries on the Laws of England;" born in London in 1723. His parents died while he was yet an infant. At seven years of age he was sent by an uncle to the Charter-house, and at twelve placed on the foundation. At sixteen he entered Pembroke College, Oxford. In 1743 he was elected fellow of All Souls College, and in three years after was called to the bar. He seems to have failed in obtaining practice, and he retired to Oxford. His connection with the duties and studies of his profession still continued. In 1749 his uncle resigned the recordership of Wallingford, Berks, in his favour. In 1753 he went to Oxford, where he delivered a course of lectures on English law. The

lectures were so successful that the importance of appointing a professor permanently was very generally felt, and funds were supplied, by means of which the Vinerian professorship was founded. The reputation of his lectures, and of an edition of the Great Charter, which he published, led to his being employed in the law courts, and his practice soon became very considerable. In 1761 he sat in Parliament for Hendon. In 1763 he was appointed solicitor-general to the queen. He was offered the chief-justiceship of the Common Pleas in Ireland, which he declined. About this time he married, and was soon after appointed principal of New Inn Hall. This appointment, as well as the Vinerian professorship, he resigned in the following year. In 1765 the first volume of his "Commentaries on the Laws" was published, and three others soon followed. As a clear accurate statement of English law, freed from technical phraseology, his work was eminently successful. His exposition of the reasons for the laws and his suggestions for their amendment were less satisfactory, and his work was sharply criticised by Bentham & Priestley. It is now generally admitted that Blackstone had but a superficial knowledge of history, and though he studied the philosophy of law he failed to master its principles. He even confutes the "laws" of God, the "laws" of Nature, and the "laws" of England! In 1770 he was offered the solicitor-generalship, which he declined. He was then made one of the justices of the Common Pleas, but to oblige Mr. Justice Yates, who wished to retire from the King's Bench to the Common Pleas, a different arrangement was adopted. On Yates' death, which soon afterwards occurred, he went to the Common Pleas, where he sat till his death in February, 1780. Blackstone is one of the many English lawyers of high reputation whom professional occupation did not wholly detach from the studies of polite literature. Every now and then we find some instructive note of his in the various editions of Shakspeare, and the "Lawyer's Farewell to his Muse," first published in Southey's "Specimens of English Poetry," is a very graceful poem. In All Souls College, Oxford, a statue of Blackstone by Bacon was erected in 1784; and in one of the chapel windows are his arms. His portrait is in the picture gallery of the university.

BLACKTHORN. See PRUNUS.

BLACKWATER. See ESSEX.

BLACKWATER. See ARMAGH, CORK.

BLACKWOOD, WILLIAM, a distinguished Scotch publisher, was born at Edinburgh, 20th November, 1776. At the age of fourteen he was apprenticed to Messrs. Bell and Bradfute, booksellers, of his native city, and he afterwards followed this business at Glasgow, Edinburgh, London, and then again at Edinburgh, where he opened a shop in 1804 for the sale of old books. In 1812 he published a valuable catalogue of 15,000 books in various languages, carefully and judiciously classified. In 1816 he disposed of his stock and devoted himself to publishing. The following year he started a monthly periodical entitled *Blackwood's Magazine*, which was from the first a great success. It was started on Tory principles to oppose the Whig party, who conducted the *Edinburgh Review*, and it has ever since remained steadfast to the same principles. Of this magazine, which can hardly be said to have had any distinct editor, Mr. Blackwood remained the principal manager until his death, which took place 16th September, 1834. He was known as a singularly upright and kind-hearted man, and he received many civic honours in his native city. Both the magazine and the publishing business were continued after his death by his sons, the Messrs. Blackwood, who have gained a world-wide reputation as publishers.

BLADDER (or *vesica urinaria*) is a musculo-membranous bag or pouch which serves as a temporary reservoir for the urine; it communicates with the kidneys

by means of the ureters, and opens externally by means of the urethra.

The urinary apparatus is confined to the red-blooded classes of animals, all of which have kidneys, whilst some orders and genera have no urinary bladder. In quadrupeds the bladder is of a pyriform shape, and is completely surrounded by the peritoneum, or serous lining of the abdomen; and it may be taken as a general rule, that it is smaller, stronger, and more muscular in carnivorous than in graminivorous animals: in the latter it is almost membranous, and in some of them is particularly large.

In birds there is no urinary bladder, and (as with reptiles) the ureters open into the cloaca, a musculo-membranous bag which takes the place of the rectum, bladder, and uterus, and serves as a reservoir for the solid excrements, the mine, and eggs. The urine in these animals dilutes the faeces and forms the carbonate of lime, which constitutes the basis of the shell. The urinary bladder exists in several genera and species of fishes.

In the human subject the bladder is placed in the pelvis or basin, immediately behind the symphysis pubis and before the rectum, or terminal portion of the intestines, in the male; but it is separated from it in the female by the uterus and vagina. Its form and relations vary according to the age of the individual. In infancy it is of a pyriform shape, and is contained almost entirely in the abdomen, thus resembling its permanent condition in quadrupeds. At this period it may be considered as consisting of three portions—the narrow tapering part or *neck*, the upper rounded portion or *fundus* (sometimes called *summit*), and the intermediate portion or *body*; but as the pelvis expands, the bladder gradually subsides into it and undergoes a remarkable change of form. Thus, in the adult its figure is that of a short oval, compressed at the fore and back part; its lower surface subsides on the rectum, and expanding, forms what is termed by anatomists the *bas fond* of the bladder. This change of form is dependent not only upon the enlargement of the cavity in which the bladder is contained, but also upon the weight of the fluid which it habitually sustains, and thus in advanced age it is more deeply sunk in the pelvis than in the middle periods of life. In the female its transverse diameter is greater than in the male, in consequence of the antero-posterior diameter of the pelvis being encroached upon by the uterus. Its capacity varies in the different periods of life; and as a general rule it may be said to increase in proportion as the individual advances in years, and to be greater in females than in males. Its capacity is modified in different individuals by their habits and the natural exercise of its functions. It is more particularly changed by disease: thus, from the effects of long-continued irritation, it may be reduced to such a state that it will not contain more than a few drops of urine; and on the contrary, when from any cause its contents cannot be duly evacuated, it may be distended so as to contain many quarts of urine, and occupy a large proportion of the abdomen. Its ordinary capacity may be estimated at a pint and a half.

The secretion of the urine is performed by the kidneys; it is constantly going on, and does not exhibit those alternations of action and repose observable in the other secreting organs.

The urine, being secreted, flows drop by drop from the ends of the ureters into the bladder, its descent being probably aided by the contractility of these tubes and the impulse of the neighbouring arteries. Two or three drops enter the bladder every minute in a healthy fasting person in an upright posture, each drop pushing aside the little papilla which blocks the orifice of the ureter till sufficient pressure is exerted to move it, and which returns to its position when the drop has passed. Erichsen made very careful observations on this point on some living subjects, who fortunately (from the surgeon's point of view, however

distressing to themselves) suffered from the curious malformation of *ectopia vesicæ* (fissure of the bladder), and gave the same facility for the examination of the bladder as the celebrated Canadian patient afforded through his wounded side for the observation of the living stomach. The flow increases shortly after eating, or during great bodily or mental exercise, and ceases while the body is recumbent, accumulating in the ureters, whence it flows in a stream into the bladder on a change of posture. Cessation to secrete urine causes death very speedily. It is prevented from regurgitating into the ureters in consequence of these tubes taking an oblique course between the muscular and mucous coats before they perforate the latter. As the urine accumulates these tubes are more and more compressed, and the obstacle to regurgitation is increased; but the column of urine descending along the ureters, being higher than that contained in the bladder, is not prevented from entering into it.

When a sufficient quantity of urine is accumulated in the bladder, varying according to the degree of irritability of the organ, a general uneasy sensation is produced, and a more particular one referred to the lower part of the bladder; the diaphragm and abdominal muscles are called into action; the resistance of the sphincter or circular muscle, forming the neck of the bladder, is overcome; the muscular fibres of the bladder contract and completely empty it.

In the article URINE it will be found that that fluid consists chiefly of nitrogenous waste and water; and, as Professor Huxley points out, its excretion by the kidneys is strictly comparable to that of carbonic acid and water, with a little urea, by the lungs; the latter organs, however, serving at once as secretors and reservoirs, functions separated in the case of the kidneys and the bladder. The difference, however, is great in another respect, for while the absorption of oxygen by the lungs is as important as the excretion of carbonic acid, &c., the renal apparatus adds nothing whatever to the body, and is simply a channel for the dissipation of wasted tissue.

The bladder is well provided with bloodvessels, lymphatics, and nerves. The spinal nerves are branches from the sacral plexus, and the sympathetic nerves arise from the hypogastric plexus.

Various accidents and diseases may prevent the bladder from evacuating its contents, in which case the organ becomes inordinately distended, and unless relieved the distension increases, inflammation ensues, a spot mortifies, the urine escapes into the abdomen, and death is speedily the result. Such is the process by which the bladder relieves itself, and it never, under such circumstances, is lacerated or burst, as it is ordinarily said to be. Such a result is never produced except by direct violence. The most important disease to which the bladder is liable is the formation of urinary calculi or concretions in it. When they are present and not encysted they produce intense suffering; and as medicines possess no certain power over them, the ingenuity of surgeons has been exercised in order to devise means of removing them. These means are reducible to three. When small they may be extracted through the urethra by a pair of forceps, invented for the purpose; when larger they may be reduced to pieces so small as to pass away with the urine, or they may be removed by cutting into the bladder. To the former of the last two methods the term LITHOTRITY is applied, to the latter that of LITHOTOMY.

BLADDER-WORT. See UTRICULARIA.

BLAIR ATHOLE, a village of N. Perthshire, on the Highland Railway, about 32 miles N.N.W. from Perth, and 488 from London, is situated on the river Tilt, in a mountainous and picturesque district, much visited by tourists. Near the village is Blair Castle, a four-storied mansion, turreted and battlemented, in the Scottish Baronial style. The vicinity is famous for the deer and grouse of

its hills, the salmon and trout of its streams, and the wealth and variety of its fauna and flora. The romantic Pass of Killiecrankie is $3\frac{1}{2}$ miles to the N.W. Population of the parish, 1800.

BLAIR, HUGH, D.D., was born in Edinburgh in 1718. He was educated at the University of Edinburgh, and took his degree of A.M. in 1739. In 1741 he was licensed to preach, and was soon after appointed to the living of Collessie in Fifeshire. In 1743 he was appointed second minister of the Canongate Church, Edinburgh; in 1754 he was presented to the ministry of Lady Yester's Church, Edinburgh; in 1757 the University of St. Andrews conferred upon him the degree of D.D.; and in 1758 he was removed from Lady Yester's to be one of the ministers of the High Church. He was indebted to his merits alone for this success. In 1762 the king erected and endowed a professorship of rhetoric and belles lettres in the University of Edinburgh, and appointed Dr. Blair regius professor, with a salary of £70. In 1783 he resigned the professorship.

The career of Dr. Blair as a divine was marked both by its success and usefulness. Notwithstanding his popularity as a preacher, he had nearly reached his sixtieth year before he could be induced to publish a volume of his sermons. When, however, it appeared it was received with an extraordinary degree of favour. The sale was so rapid and extensive that the original sum paid for the copyright (£100) was voluntarily doubled by the publisher; and £300 was offered for the next volume. It is stated that Dr. Blair was paid at the rate of £600 for each of the subsequent volumes. In 1780 a pension of £200 a year was conferred upon him by the king, which he enjoyed till his death on 27th December, 1799.

Dr. Blair's literary reputation rests upon his "Sermons," and his "Lectures on Rhetoric and Belles Lettres," both of which have enjoyed a long period of popularity. The "Sermons" are still read by many people with pleasure, on account of their clear and easy style, and the vein of sensible though not very profound observation which runs through them; but they have no claim to be ranked among the best and most solid specimens of sermon-writing which our language contains. The "Lectures" have not been less popular than the "Sermons," and have long been considered as a text-book for the student. They are, however, exceedingly feeble productions, and show no intimate acquaintance with the best writers, ancient or modern; nor do they develop and illustrate, as a general rule, any sound practical principles.

BLAIR, ROBERT, was born in the year 1699. Few particulars are known respecting him beyond the fact that he was educated at the University of Edinburgh, and travelled abroad before his ordination. On the 5th January, 1731, he was ordained minister of Athelstanford, in Scotland, where he spent the remainder of his life. He appears to have been in easy circumstances, was fond of gardening, and had a taste for botany. In the pulpit he was earnest and impressive. Watts and Doddridge honoured him with their esteem: he submitted his famous poem of "The Grave" to them, and in a letter to Doddridge states that it was written before his ordination. "The Grave" is written in a striking and vigorous manner, and it had the honour of being illustrated by that eccentric artist, William Blake, in 1808. With the exception of a few short pieces, "The Grave" is the only production of Blair's which we possess. The author died of a fever, 4th February, 1746, in the forty-seventh year of his age.

BLAIRGOWRIE, a Perthshire town, 4 miles N.W. from Cupar-Angus, and 473 from London by the Caledonian Railway, situated on the S. side of the Ericht. It is a well-built thriving town, with spacious market-place and handsome villas, is beautifully situated, and is the seat of extensive flax manufactures. Population, 5300.

BLAISOS, a district in the former province of Orléanais, which now forms the greater part of the department of LOIRET-CHER. Blois, Chambord, and Romorantin were the chief towns.

BLAKE, ADMIRAL ROBERT, was one of the most illustrious and successful commanders that have adorned the British navy. He was born in August, 1598, at Bridgewater, in Somersetshire, and was educated at the free school of that place until he was of age to be removed to Oxford, where he became successively a member of Alban Hall and Wadham College. Blake sat for Bridgewater in the Short Parliament of April, 1640, but not in the Long Parliament, which began in November of the same year. On the breaking out of the civil war he entered the Parliamentary army, and continued to serve till 1649. It is recorded that he disapproved of the extremities to which matters were pushed against Charles I.

In February, 1649, Colonel Blake, in conjunction with two officers of the same rank, Deane and Popham, was appointed to command the fleet. For this new office Blake soon showed signal capacity. He destroyed Prince Rupert's fleet, and took the Scilly Islands, Guernsey, and Jersey, from the Royalists, and in the same year he was elected a member of the council of state.

In March, 1652, Blake was appointed sole admiral for nine months, in expectation of the Dutch war, which did in fact break out in the following May in consequence of Van Tromp, the Dutch admiral, standing over to the English coast, and insulting the English flag. Blake defeated him in a sharp action, 19th May, in the Straits of Dover. On the 12th of August Blake returned to the Downs, and on 28th September the hostile fleets again came to an engagement, in which the Dutch rear-admiral was taken, and three other of their ships were destroyed. After this battle the English fleet in the Channel was reduced to forty sail, when Van Tromp again stood over to the English coast with eighty men-of-war. An action was fought off the Goodwin Sands, 29th November. Two of Blake's ships were taken, and four destroyed; the rest were so much shattered that they were glad to run for shelter into the Thames; and Van Tromp, in an idle bravado, sailed through the Channel with a broom at his masthead. Blake, however, again put to sea in February, 1653, with eighty ships, and on the 18th he fell in with Van Tromp, in the Channel, with nearly equal force. A running battle ensued, which was continued during three consecutive days. In this long and obstinate fight the English lost one man-of-war, the Dutch eleven men-of-war and thirty merchantmen; but the number killed is said to have amounted to 1500 on each side. Blake himself was severely wounded in the thigh. Another great battle took place on the 3rd and 4th of June, between Van Tromp and Generals Deane and Monk. On the first day the Dutch had the advantage; on the second Blake arrived with a reinforcement of eighteen sail, which turned the scale in favour of the English. Bad health then obliged him to quit the sea, so that he was not present at the great victory of 29th July (the last which took place during this war), in which Van Tromp was killed. When Cromwell dissolved the Long Parliament and assumed the office of Protector, Blake sat in the first two parliaments which Cromwell summoned, and was soon employed to bring to terms the Duke of Tuscany and the Order of Malta, as well as the piratical states of Algiers, Tripoli, and Tunis. These transactions occurred in the spring of 1655.

On the breaking out of war between Spain and England in 1656, Blake took his station to blockade the Bay of Cadiz. Having heard that a Spanish fleet had put into the island of Teneriffe, he sailed thither, and arrived in the road of Santa Cruz, 20th April. The bay was strongly fortified, with a formidable castle at the entrance, and a chain of smaller forts at intervals round it; and

there was also a considerable naval force, strongly posted. He attacked them notwithstanding, silenced the forts, and sunk and burned the ships. His own loss in killed and wounded did not exceed 200 men, while the slaughter on board the Spanish ships and on shore was very large.

Blake then returned to his old station off Cadiz; but the increase of his disorders, which were dropsy and scurvy, made him wish to return to England—a wish, however, he did not live to accomplish. He died as he was entering Plymouth Sound, 17th August, 1657. His body, being transported to London, was buried with great pomp in Westminster Abbey, at the public expense. After the Restoration it was disinterred, on the anniversary of the execution of Charles I., together with those of Cromwell, Ireton, Pym, and others, and thrown into a pit in St. Margaret's Churchyard.

(Clarendon's "History;" Hentz's "Chronicle of the Civil Wars," and the "Memoirs" of Whitelock, Ludlow, and other contemporary authorities; "Robert Blake, Admiral and General at Sea," by Hepworth Dixon, London, 1852.)

BLAKE, WILLIAM. This extraordinary artist, poet, and self-styled prophet, was the son of a London hosier, and was born in London in 1757. At the age of fourteen his father was induced, by his son's passion for drawing, to apprentice him to an engraver of the name of Basire. He was a diligent and enthusiastic student. The day he devoted to the graver, and the night to poetry. When he was twenty-six years of age he married Catherine Boncher, who survived him, and was a most devoted and attached wife, and fully appreciated the peculiarities of his mind. They lived at 28 Poland Street, and there Blake, with his wife always by his side, produced a series of designs and poems which are quite unique in the peculiar spirit of their conception, and notwithstanding their peculiarity are replete with beauties of the highest order.

The first of his own publications was the "Songs of Innocence," which appeared, with etched illustrations, in 1787. These etchings and poems are executed in a very peculiar and original manner. The designs were drawn and the poems written upon the copper, with a secret composition (discovered to him by the spirit of his brother Robert, as he says); and when the uncovered parts were eaten away by aquafortis the rest remained as if in stereotype. His wife worked off the plates in the press, and Blake tinted the impressions, designs, borderings, and letterpress in charmingly harmonious colour.

About the year 1800 Blake's mind was confirmed in that extraordinary state which many suppose to have been a species of mild insanity. He was so exclusively occupied with his own ideas that he at last persuaded himself that his imaginings were spiritual realities. He thought that he conversed with the spirits of the long-departed great—of Homer, Moses, Pindar, Virgil, Dante, Milton, and many others; some of these spirits sat to him for their portraits. In 1809 he exhibited some of his pictures. He seems to have injured himself very much in the opinion of the world by the extremities he went to in the catalogue of this exhibition. He was comparatively neglected after its publication, and the demand for his works very much declined. He became extremely poor, but he still continued to produce new works. He died on the 12th of August, 1828.

During the thirty years in which he laboured with his pen and graver, Blake produced a great variety of works, many of which now obtain high prices. The principal are the "Songs of Innocence" (1787) and the "Songs of Experience" (1794), on which his fame as a poet almost entirely rests; illustrations of Young's "Night Thoughts," of Blair's "Grave," and of the Book of Job; and the most extraordinary "prophetic books," sometimes very grand, sometimes unintelligible, but always beautiful, if only for the exquisite designs, bordering, and interweaving with the text

- in Blake's usual manner—such as "The Marriage of Heaven and Hell" (1790), "The Gates of Paradise" (1793), "Jerusalem" (1804), &c. A very elegant edition of the "Songs of Innocence," &c., was published in London in 1839, with a preface containing some excellent remarks upon Blake's character; and very appreciative memoirs of him have been written by Mr. A. Swinburne (1868), Mr. Gilchrist (1863), and W. M. Rossetti (1880), in each case with copious selections from his works.

BLANC, LOUIS, a distinguished French political writer and statesman, was born at Madrid on the 29th October, 1811. His family, originally from Roverga in Corsica, had suffered severely in the French Revolution, and its head had been put to death during the Reign of Terror. His father was inspector-general of the finances in Spain under the government of Joseph Bonaparte, and his mother, *née* Estelle Pozzo de Borgo, was a sister of the celebrated diplomatist. He was educated at the College of Rodez, and had to shift for himself at the age of nineteen. He began life as clerk to an attorney, then became mathematical teacher in some small private schools of Paris, and subsequently accepted a private tutorship in the house of a rich manufacturer at Arias. In this city he remained for two years, and having carried off the prizes in some poetical competitions instituted by the local academy, he decided that he had a vocation for literature. Among his earliest contributions was an essay to the *National* on the "Eighteenth Century," in which he denied the claims of Voltaire, the aristocrat, to popular gratitude as a reformer, and declared Rousseau to be the true people's man, the principal author of the Revolution, and the prophet of Socialism. His articles in other newspapers were in much the same strain. They showed a violent prejudice against the upper and middle classes, and a boundless belief in the virtues of the lower ones. This belief was expressed with an ecstasy too absurd not to be genuine. Louis Blanc, like other earnest young thinkers of his time, had made up his mind that, since it was easy to create ideal social systems on paper, it would be equally so to pull down the material fabric of society and reconstruct it on a new basis. To do him justice, he shrank from advocating bloodshed as an indispensable preliminary to the establishment of fraternity. In 1839 he published his "Compte Rendu des Idées Napoléoniennes," and a few days later he became the victim of a brutal aggression, which nearly cost him his life. He was waylaid at night as he was returning home, and beaten senseless. The natural consequence of the assault was to dignify the victim with the halo of martyrdom; it was assumed that the powers of the day had sought to get rid of him, and when in 1841 he published in the *Revue du Progrès* (which he had started) his famous essay on the "Organization of Labour," it was received with avidity by half educated working men as the revelation of a new gospel. The gist of it lay in a truism worthy of the legendary Joseph l'ind'homme. Individualism is the cause of all human troubles. Each man cares for himself more than for his neighbour. Under a properly constituted social system all inducements to selfishness would be removed, for every man would work according to the measure of his ability and receive according to his needs. The theorist only forgot to explain what incentive a man would have to work to the full extent of his ability if his individual needs happened to be small. If the happiness of supplying the larger needs of an idler or more incompetent brother proved inoperative, what became, then, of the whole system?

Fortunately for Louis Blanc's reputation, he did not always write on economical mysteries. His "History of Ten Years," published in 1841, was a vigorous piece of political pamphleteering, which, from the Republican party point of view, did immense good in shaking the Monarchy of July. It was a summary of the events of the ten years

between 1830 and 1840; and as all the facts which could tell against Louis Philippe and his various Ministers were grouped with much ingenuity, as the style of the writer was polished, and his tone like that of a prophet who feels quite sure of himself when foretelling disaster, the success of the book was great. His "History of the French Revolution," the first two volumes of which were issued in 1847, is open to the graver reproach of having glorified men whom the author well knew to have been sorry creatures indeed. One must have seen Louis Blanc and heard him in private life to understand what an enormity it was for a man so uniformly gentle, amiable, and sensible as he to profess anything but abomination of such characters as Robespierre and Marat. The Revolution of 1848 placed him suddenly in a commanding position. Elected by popular acclamation member of the Provisional Government, he would not assume the duties of any state department, but took upon himself to instruct the masses by means of lectures delivered in the quondam Chamber of Peers at the Luxembourg. The enthusiasm which these lectures excited appears almost incredible, when they are read by the cold light of after events. He proposed by means of a government loan to create social work-shops for all the most important branches of national industry, upon a novel plan, which failed, like many other theories unsupported by facts. The Communist movement resulted in the insurrection of June, which was repressed with sanguinary severity. In September the Assembly ordered him to be prosecuted for conspiracy, and after some narrow escapes he quitted France for England. Here he lived in retirement, employed in completing his great work, "The History of the French Revolution," which was published in twelve volumes. While in England he acted as correspondent to several French journals. He returned to France on the fall of the French Empire in 1870, not having taken advantage of the permission to do so granted in 1869. In Paris he was elected the first of forty-three deputies for the Seine to the National Assembly, and was re-elected on every succeeding occasion whilst he lived. His simplicity, his conviction, the union of keen intellectual vivacity with infinite gentleness, the intrepidity and courage of his life, won for him the affectionate admiration of all who came into familiar contact with him. It is true that his social theories struck most Englishmen as being tainted with unsoundness, and he was at all times more of a man of letters than a statesman. But he had the charm of the enthusiast, and bore the rigours of private adversity and the bitter disappointment of public hopes with a fortitude and constancy that never faltered. He died at Cannes, 6th December, 1882, and his remains were brought to Paris and honoured with a public funeral in Père la Chaise.

BLANC, MONT, in the system of the Alps, is situated in the French department of Savoy, on the boundary line between Savoy and Piedmont. It extends about 13 miles in length and about 6 miles in breadth.

This enormous mass of primitive rock rises far above the line of perpetual congelation, and descends with great steepness and to a great depth on the N.W. and S.E., the valleys which bound the mountain on these sides being only between 3000 and 4000 feet above the level of the sea. The valleys to the N.W. are those of Montjoie and of Chamoumy. The latter is commonly resorted to by tourists who wish to have a view of Mont Blanc, or to ascend it; the village of Chamoumy, which is nearly in the centre of the valley, is 3403 feet above the level of the sea. The valley to the S.E. of the mountain mass is the Val d'Entrèves, at the lowest point of which is Cormaggiore or Cornayeure, situated 3900 feet above the level of the sea, and at the head of the Val d'Aosta. The southern extremity of the mountain is connected with the high mountain range which extends in a southern direction to the Mediterranean Sea, by the Col de Seigne, a pass which rises to the height of

8083 feet, and unites the valleys of Bonneval and Entrèves, and presents one of the grandest views of Mont Blanc.

The northern extremity of the mountain is connected by the Col de Ferret with the high range which, running east, separates the Valais from Piedmont, and with another which, extending in a north western direction, divides Savoy from the Valais, and terminates at no great distance from the Lake of Geneva by the Col de Balmo. The whole mountain mass inclosed between the valleys and these three mountain passes probably rises to upwards of 10,000 feet, and is all covered with snow, except in a few places where the steepness of the rock does not allow the snow to lie. The upper surface is extremely irregular, and a considerable number of rocks rise from it, which are called *aiguilles*, or needles.

Towards its southern extremity this extensive mass of rock rises to its greatest elevation in that mountain pinnacle properly called *Mont Blanc*, the summit of which is 15,781 feet above the sea. When seen from the north or south, it presents the form of a pyramid, descending nearly perpendicularly to the south. When seen from the valley of Chamonix it resembles the back of a dronedary, and is called by the inhabitants of that valley *Bosse de Dromadaire*.

Mont Blanc exhibits all the grandeur of the Alps on a large scale. High tapering pyramids covered with eternal snow; extensive fields of ice, split to a great depth by wide fissures; glaciers of a green colour descending from its sides between bare dark-coloured perpendicular rocks, and skirted by forests of fir; and grottoes formed in the masses of eternal ice, in addition to all the other varieties of mountain scenery, attract great numbers of travellers. Mont Blanc was ascended for the first time by Dr. Paecard and James Balmat, with great difficulty and danger, in August, 1786. A year afterwards, De Saussure succeeded in reaching the summit, where he remained for five hours, and made a great number of observations. The whole journey to the top and back can now be made in from 50 to 60 hours, and is accomplished every year by numerous tourists. In general, however, the view is hardly worth the fatigue, the extreme height of the position, even when the outlook is unclouded, rendering the prospect indistinct.

BLANCHARD (aeromut). See BALLOON.

BLANÇO, CAPE, on the west coast of Africa, in 20° 46' 26" N. lat., 17° 4' 10" W. lon., is the western extremity of a rocky ridge called Jebel-el-Bied, which extends eastward into the Sahara to an unknown distance. The cape itself terminates in a rocky but low point, which bends to the southward, and forms with the shore a spacious harbour, called the Great Bay. A few miles further south is another harbour, the Bay of Arguin, which is by many considered as the extreme point to which ancient navigation extended. The coast to the N. of the cape is rocky and of very moderate elevation, except at a few places, as at Cape Bojador and Cape Noon; it is very little broken, and contains only a few harbours. This is the more to be regretted, as the coast is one of the most dangerous on the globe. Though nearly the whole of this coast lies within the sphere of the trade winds, they do not extend to the shore itself, for to a distance of about 150 miles and upwards a western wind always prevails. This is caused by the heat of the Sahara, which rarefies the superincumbent air; the heated air rises, and its place is supplied by fresh air from the sea. The sea along the whole coast is also kept in continual motion by the N. African or Guinea current. [See ATLANTIC OCEAN.] In consequence of these combined causes many vessels are lost on this shore, and the crews fall into the hands of tribes who are among the most cruel and barbarous on the globe. South of the Bay of Arguin, the shores are low and sandy as far as Cape Verde, and even to the mouth of the Rio Grande. Here the current and the trade winds are both more favourable to navigators. There are no harbours between the Bay of Arguin and the

mouth of the Senegal. Fresh water is found about 4 or 5 miles N. of the cape. Cape Blanco is also the name given to headlands in Spain, Greece, and America.

BLANDFORD FORUM, a town of Dorsetshire, 16 miles N.E. from Dorchester, and 124 S.W. from London by the South-western Railway, is situated on the Stour, which flows on the S. and W. sides of the town, amongst many pleasant meadows and woodlands. The river, which is here of considerable width, is crossed by three bridges. The town was almost entirely destroyed by fire in 1731. The houses are consequently modern, and are built uniformly of brick, and the streets are regular and well paved. The sanitary condition of the town has also been much improved of late years. Blandford was formerly noted for its lace, but none is now made. The town has, however, a good retail trade, as it is the centre of a rich agricultural district, and there are many wealthy residents. The town-hall and the church are both of Grecian architecture. There are also Nonconformist chapels, a free grammar-school, blue-coat school, and some almshouses. Bryanstone Park, the seat of Lord Portman, adjoins the town. Near it is also a fine down. Blandford is a municipal borough, and is governed by four aldermen and twelve councillors. It gives the title of marquis to the dukes of Marlborough. Population of borough, 1373; of parish, 8791.

BLANE, SIR GILBERT, an eminent physician, was fourth son of Gilbert Blane of Blanefield, in the county of Ayr, in Scotland, at which place he was born, 29th August, 1749. He studied medicine and graduated in Edinburgh. After obtaining his degree of Doctor of Medicine he was recommended by Dr. Cullen to Dr. William Hunter, at that time the most eminent teacher of anatomy in London, and in high estimation as a physician. Through his instrumentality Dr. Blane was appointed private physician to Lord Holderness. This appointment introduced him to the notice of Lord Rodney, who nominated him his private physician, in which capacity he accompanied Lord Rodney when, in 1780, he assumed the command of the squadron on the West Indian station. In the course of the first engagement, every officer being either killed, wounded, or employed, Dr. Blane came to the assistance of the admiral, and displayed such cool courage that, on the recommendation of Lord Rodney, he was instituted at once to the high office of physician to the fleet. He remained on the West Indian station till 1783. Soon after his return to England he embodied the results of his experience in a volume which he published in 1783, entitled "Observations on the Diseases of Seamen" (8vo, London).

In 1785 he was elected physician to St. Thomas' Hospital. About this time he was appointed one of the commissioners of sick and wounded sailors, and in 1795 was placed at the head of the Navy Medical Board. During the time that Earl Spencer was first lord of the Admiralty, Dr. Blane, seconded by that nobleman, was enabled to effect the introduction into every ship of the use of lemon-juice, as a preventive and cure for scurvy. This measure has had the beneficial effect of almost completely eradicating scurvy at sea, and has done more to keep up our naval force in a state of efficiency than any other measure. He died 26th June, 1834, in the eighty-fifth year of his age.

BLANK VERSE, verse without rhyme or the consonance of final syllables. Of this species is all the verse of the ancient Greeks and Romans that has come down to us. But during the middle ages rhyme, however it originated, came to be employed as a common ornament of poetical composition, both in Latin and in the vernacular tongues of most of the modern nations of Europe. In the fifteenth century, when a recurrence to classical models became the fashion, attempts were made in various languages to reject rhyme as a relic of barbarism. Poems in blank verse have since been successfully written in the

heroic measure, and a few in lyric, in all the languages except the French.

The first English blank verse ever written appears to have been the translation of the first and fourth books of the *Æneid*, by Lord Surrey, which was printed in 1557, but which must have been written at least ten years before, for Surrey was executed in 1547. The first who imitated Surrey in the new kind of verse which he had introduced was, according to Warton, Nicholas Grimald, or Grimalde, some of whose poetical compositions were first printed in the same volume in which Surrey's translation from Virgil appeared. The next thirty years may be said to have naturalized the new mode of versification in the language. The first theatrical piece which appeared in blank verse was Lord Sackville's tragedy of "Gorboduc," which was acted in the hall of the Inner Temple in 1561, though, as printed in 1565, it bore the title of "Ferrex and Porrex." When Shakspeare began to write for the stage, he may be said to have found blank verse already familiar to the public ear as the legitimate form of dramatic poetry.

The employment of blank verse was almost confined to the drama for the greater part of the seventeenth century. Drayton, and Daniel, and Phineas Fletcher, and Davenant, all in that interval wrote long poems, and all in rhyme. Even dramatic composition had, after the Restoration, in the hands of Dryden and others, begun to revert to that form. At length, in 1667, appeared the "Paradise Lost," and vindicated the capabilities of blank verse, in poetry not dramatic, by the noblest exemplification of it the language yet possesses. For the last century and a half blank verse may be said to have been recognized as the only legitimate form for the higher species of dramatic composition.

The German probably, of all the languages of modern Europe, admits the greatest variety of blank verse measures. From the practice of modern German poets, it would appear that any species of verse which may be used in that language with rhyme may also be used without it.

The expression "blank verse" looks like a French phrase, but French writers speak of it as one of English invention. Johnson, in his dictionary, explains "blank" here as meaning "where the rhyme is blanchet or missed;" and he quotes as his oldest example of the use of the expression the following sentence from Shakspeare:—"The lady shall say her mind freely, or the blank verse shall halt for it." The poet Daniel, in his "Apology for Rhyme," published in 1603, appears to designate what we now call blank verse by the expression *single numbers*. The Italians call blank verse *verso sciolto*, that is, loosened or untrammelled verse.

BLANKENBURG, a town of the duchy of Brunswick, and capital of the district of Blankenburg, on a rivulet of the same name, 87 miles S.S.E. of Brunswick. The population in 1883 was 4000, and was chiefly engaged in mining. The town is surrounded by walls; it has some good buildings, including a gymnasium and a school of industry. On a hill immediately adjoining is a large heavy-looking palace of the Duke of Brunswick. It had a good collection of pictures, but the best of them have been removed. On the summit of the Regenstein, also at a short distance from the town, are the remains of a large castle, constructed by Henry the Fowler in 919, consisting of chambers cut out of the rock. Perhaps the most important and interesting fact about Blankenburg is that here, in his native Thuringia, the great FRIEDRICH FROEBEL set up the first KINDERGARTEN. Its opening was carefully timed, in his poetical way, to happen on the 400th anniversary of printing, in 1842. Thus at sixty did Froebel revolutionize the education of infants beneath school age. On his death in 1852 Madame Von Marenholtz Bülow, one of his disciples, erected to Froebel's memory a marble monument at Blankenburg in the form of a *cube*, supporting a *cylinder*, surmounted by a *ball*—the three famous Gifts of the Kindergarten. On the centenary of Froebel's

birth (1882) a model Kindergarten was opened in Blankenburg by subscription from various countries where the Kindergarten system has taken root.

BLANTYRE, a parish of Lanarkshire, is 8 miles S.E. of Glasgow, and has cotton-spinning and dye works. Population, 3472. David Livingstone, the African traveller, was born here in 1817. It gives a barony to the Stewart family, who have a noble mansion at Erskine, on the bank of the Clyde. Ruins of an ancient priory are situated within the deme-ne. An improved water supply was introduced in 1881 at a cost of £10,000. There are several collieries within the parish, one of which (that of Blantyre) was in 1877 and 1879 the scene of great explosions, which caused the death of 220 and 29 persons respectively.

BLARNEY, a small village of Ireland, about 6 miles north-west of Cork. The Castle of Blarney was held, during the insurrection of 1602, by Cormuck McCarthy, who ultimately concluded an armistice with Lord President Carew, on condition of surrendering the castle to the English garrison. Day after day Lord Carew looked for the fulfilment of the terms, but received nothing but soft speeches, till he became the laughing-stock of Elizabeth's ministers, as the dupe of the Lord of Blarney. Hence the word *blarney* has been applied to the peculiar kind of eloquence with which the Irish are said to be gifted. An ancient stone called the *Blarney stone*, near the top of the castle, is said to confer this gift upon those who kiss it.

BLASIUS, saint and martyr, was bishop of Sebaste in Cappadocia at the time when Licinius, the rival of Constantine, began his persecution of the Christians. He fled from the town into the wilderness, and hid himself among the rocks, but being discovered was brought back and commanded to deny Christ. This he firmly refused to do, and was in consequence tortured to death in 316 A.D. Among the instruments used in his martyrdom was a wool comb, and from this he has been claimed by the wool-combers as their patron saint. At Bradford, in Yorkshire, a procession is still made every seven years on his day, 3rd February. In the Greek calendar his festival is appointed for 11th February. His aid was formerly invoked also in cases of sore throat, from a story that he saved the only son of a widow from being choked by a fish bone.

BLASPHEMY (Gr. *blasphēmia*). The word is Greek, but it has found its way into the English and several other modern languages. Etymologically, it denotes speaking so as to hurt; the using to a person's face reproachful and insulting expressions. In this general way it is used by Greek writers, and even in the New Testament, as in 1 Tim. vi. 4, "Whereof cometh envy, strife, railings, evil surmising," where the word rendered "railings" is in the original "blasphemies."

But, besides being used to denote insulting and opprobrious speech in general, it was used to denote speech of that kind of a peculiar nature, when the object against which it was directed was a person esteemed sacred, but especially when against God. Of this we have an instance in Lev. xxiv. 10-16. This kind of blasphemy constituted the crime against which, in the Mosaic code, the punishment of death was denounced. But among the later Jews other things were brought within the compass of this law; and it was laid hold of as a means of opposing the influence of the teaching of Jesus Christ, and of giving the form of law to the persecution of himself and his followers. Thus to speak evilly or reproachfully of sacred things or places was construed into blasphemy. The charge against Stephen was that he "ceased not to speak blasphemous words against this holy place and the law" (Acts vi. 13); and he was punished by stoning, the peculiar mode of putting to death prescribed by the Jewish law for blasphemy. Our Lord himself was put to death as one convicted of this crime, so far as the condemnation of the Jews was concerned (Mark xiv. 61-64).

Among the canonists, the definition of blasphemy is made to include the denying of God, or the asserting of anything to be God which is not God; and this extended application of the term has been received in most Christian countries, and punishments have been affixed to the offence.

In England, by the common law, open blasphemy was punishable by fine and imprisonment, or other infamous corporal punishment. The kind of blasphemy which was thus cognizable is described by Blackstone to be "denying the being or providence of God, contumelious reproaches of our Saviour Christ, profane scoffing at the Holy Scripture, or exposing it to contempt and ridicule" ("Commentaries," b. iv. c. 4). There is nothing in the statute-book under the word blasphemy till we come to the time of King William III. In his reign an Act was passed, the title of which is, "An Act for the more effectual Suppression of Blasphemy and Profaneness." In this Act the primitive meaning of blasphemy, and of profaneness also, was entirely lost sight of, and the Act was directed to the restraint of all free investigation of positions respecting things esteemed sacred. It is as follows:—"Whereas many persons have of late years openly avowed and published many blasphemous and infamous opinions contrary to the doctrines and principles of the Christian religion, greatly tending to the dishonour of Almighty God, and may prove destructive to the peace and welfare of this kingdom; wherefore, for the more effectual suppressing of the said detestable crimes, be it enacted, that if any person or persons having been educated in, or at any time having made profession of, the Christian religion within this realm, shall, by writing, printing, teaching, or advised speaking, deny any one of the persons of the Holy Trinity to be God, or shall assert or maintain that there are more gods than one, or shall deny the Christian religion to be true, or the Holy Scriptures of the Old and New Testament to be of divine authority," &c. These are the whole of the offences comprised in this Act. The penalties are disqualifications; incapacity to act as executor or guardian, or to receive legacies; three years' imprisonment (9 Will. III. c. 35). If, however, within four months after the first conviction, the offender will renounce his error in open court, he is for that time discharged from all disabilities. It is evident that the writings alluded to in the preamble were not in any proper sense of the term blasphemous, and the title is palpably a misnomer. The delivery either from the pulpit or the press of the results of reflection and inquiry applied to the divine authority of the Scriptures, or of any particular book included within that term, to the claim of Christianity to be a divine institution, or to the claim of the doctrine of the Trinity to be received as part of Christianity, can never be regarded as blasphemy or profaneness; however, in particular instances it may sometimes be accompanied by expressions which may bring the individual using them within the scope of a charge of blasphemy. In Blackstone this statute is not placed under Blasphemy but under Apostasy. In 1813 a bill was introduced into Parliament, to relieve persons holding Unitarian views from the operation of this statute, and it passed without opposition. This Act is commonly called Mr. Smith's Act, after the name of Mr. William Smith, then member for Norwich, by whom it was introduced. The Act of William III. had for a long time been regarded as practically a dead letter, when in 1883 public attention was called to the subject by the prosecution of two persons who had been concerned in publishing some exceedingly coarse and violent attacks upon Christianity and the Bible. Tried at the Central Criminal Court before Mr. Justice North, they were found guilty and sentenced to terms of imprisonment. The definition of the law, however, given at this trial excited considerable comment, and when the same persons were afterwards brought before Lord Coleridge, the lord chief-justice, charged with a similar offence.

the learned judge in his summing up delivered an elaborate exposition of the law upon the subject. The old conception that Christianity formed part of the law of the land, and therefore that any opposition to it was illegal, was entirely set aside by his lordship, who pointed out that since this was declared to be law Jews had been admitted to Parliament, and one had been appointed a judge. He held further that the law had always taken into consideration the motives prompting publications charged with being blasphemous, and he maintained that at the present day, so long as the decencies of controversy are observed, even the fundamentals of religion may be assailed without the writer incurring any legal guilt. At the same time, however, he declared that writings or utterances maliciously designed to outrage the feelings of religious people, were blasphemous libels and offences against the common law of the realm.

BLASTING has long been practised as the most efficient mode of removing or detaching heavy masses of rock in mining operations, and, by reason of recent improvements, has become one of the most important resources of the civil engineer. The old method of blasting rocks consisted in drilling or boring a hole to a considerable depth with suitable instruments, depositing a charge of gunpowder at the lower or further end of the hole, and then filling up or "tamping" the remainder of the hole with clay, or some other soft mineral substance, well rammed, to make it as tight as possible. A wire laid in the hole during the operation was subsequently withdrawn, and a train of gunpowder inserted in its place; and this train, and subsequently the blast itself, was fired by a slow match (often consisting simply of brown paper smeared with grease), intended to burn long enough to allow the person who fired it to reach a place of safety. Many accidents have arisen from the uncertainty of this process, the risk of which has, however, been lessened by the substitution of copper for iron in the "needle," by which a passage for the train is formed, and of Beekford's "safety fuse," which consists of a small train of powder inserted in a waterproof cord, which burns at so steady and uniform a rate that by cutting it to a suitable length any desired interval may be secured between the lighting and the explosion. A great improvement, however, consisted in the employment of a galvanic current to ignite the powder—an arrangement which rendered premature explosion next to impossible. A galvanic current, so long as it passes along an uninterrupted wire, is perfectly harmless; but if the course be interrupted by breaking the continuity of the wire intense heat sufficient to ignite powder is produced. In addition to the superior safety and certainty of this mode of firing, it has the advantage of being applicable under water as well as on land, and, by its perfectly instantaneous action, of enabling the engineer to fire as many blasts as he may desire at one operation, so as to accomplish, by their joint action, effects otherwise unattainable.

General Pasley was the first to employ galvanism in submarine blasting in 1839, in his successful operations on the wreck of the *Royal George* at Spithead. Shortly afterwards galvanic blasting, both on land and under water, was practised in America and in Scotland; but it was in 1843 that Mr. William Cubitt commenced, on the works of the South-eastern Railway, the stupendous operations which established its capabilities on a scale never before attempted. He began by throwing down, by three simultaneous blasts, consuming together about 18,000 lbs., or more than 8 tons of gunpowder, a bulky promontory called the Round Down Cliff, between the Abbot's Cliff and Shakspeare Tunnels, near Dover. By this operation, which was attended with very little noise, a cliff nearly 400 feet high was thrown down, and no less than 400,000 cubic yards of chalk were distributed over the beach, covering an area of 18 acres to an average depth of 14 feet; and it

was computed that £7000 and six months' time were saved to the company. Another remarkable instance of the use of blasting was in the construction of the Holyhead Breakwater. An enormous quantity of stone, amounting to about 5,000,000 tons, was required for this work, and to obtain this mines were made in the rock, and such large charges employed that 10,000 or 12,000 tons of stone were frequently obtained from a single explosion.

Gun-cotton is often used in military and naval engineering, and slabs and charges of it are now regularly prepared and stored at Woolwich for these purposes. In civil engineering a still more powerful agent has been introduced, in the shape of dynamite, and this, from its portability and enormous force, seems destined to supersede both gunpowder and gun-cotton. It is composed of nitro-glycerine, mixed with sufficient porous earth to give it the consistency of a stiff paste. Among the more modern applications of boring and blasting the most remarkable are those of the Mont Cenis, the St. Gothard, and the Hoosac tunnels. See DYNAMITE and NITRO-GLYCERINE.

BLASTING GELATINE. See NITRO-GLYCERINE.

BLAST FURNACE, a furnace to which air is introduced under strong pressure, and which is used chiefly in smelting iron ores. Blast furnaces are conical in shape, having the top of the cone taken off, and vary in height from 70 to 90 or even 100 feet, according to the nature of the ore and fuel employed. The usual forms of blast furnace are shown in the Plate. In fig. 1 *h* is the *crucible* or well of the furnace, the bottom of which is termed the *hearth*. The furnace gradually widens out above the crucible, forming an inverted cone, the sides of which, *g*, are termed *boshes*. The top of the boshes is the widest point in the furnace, and the term "diameter of the bosh" is understood to mean diameter at this point. From the top of the bosh the furnace gradually narrows into the mouth. The mouth of the furnace is now usually closed by a cap and cone of iron, *a* and *b*, the cone being suspended below the cap, so that by lowering the former a space is left for the materials to pass into the furnace. When the cone is drawn up it completely closes the aperture in the cap, and an opening is therefore left in the side of the furnace below the cap for the escape of the furnace gases. As these consist largely of combustible gas, they are led off through the gas-box, *c* (fig. 1), and downcomer, *d*, to be burnt under steam boilers, or in the stoves for heating the blast.

The openings, *ll*, in the top of the crucible (fig. 1) are termed the "twyer rooms." The pipes conveying the blast into the furnace are termed the "blast mains." A circular main, *m*, termed the "horse-shoe main," partly surrounds the furnace. From this branches descend to distribute the

blast around the furnace. The ends of these branches are formed in separate pieces. The portions projecting into the furnace are termed "twyers," and the next piece, *jj*, is termed the "swan neck" or belly pipe. When hot blast is used the twyers have to be kept cool by water. The number of twyers in a furnace generally varies from three to eight. Five is the most usual number. It is important to distribute the blast evenly; but at the same time it is necessary to keep a sufficient volume passing through each twyer, that it may force its way into the centre of the furnace, and not creep up the sides.

In addition to the openings into the bottom of the furnace for twyers there are two others, one at the bottom of the crucible for the exit of molten iron, the other higher up for running off the slag. The top hole is usually stopped up with clay. It is important to use clay for this purpose which, on the one hand, will not melt too easily, and on the other does not bake too hard. A mixture of two parts fire-clay and one of small coal ground together is commonly employed.

In order to get at the twyers easily the superstructure of the furnace is supported by four or five brick pillars or iron columns. A strong circular iron casting is placed on the top of the pillars or columns, and the upper part of the furnace rests on this. The furnace itself is built of the best firebrick, and the upper part is either altogether cased with wrought-iron, or braced together by a series of iron hoops. The top part of the furnace is covered in, and so expanded as to form a gantry, giving sufficient room for the charging barrows to be wheeled conveniently. The charging hole is generally protected by a cylindrical structure of sheet iron, sometimes lined with brickwork, termed the tunnel head. Openings in this admit the charging barrows to be tipped. Another pattern of furnace, 95 feet in height, is shown in fig. 2 of Plate, such as are generally employed in the Cleveland district.

BLAUW'BOK (*Antelope leucophaea*) is an ANTELOPE inhabiting Southern Africa. It stands about 5 feet high at the shoulder, and is furnished with scimitar-shaped horns 2 feet in length; they are strongly curved backwards, and marked with about thirty conspicuous rings. The face is black, with white streaks in front and behind the eyes, the muzzle and under parts being also white. The ears are pointed, and 14 inches long. The hair exhibits a roan or reddish-white colour generally. The females are hornless. The blawbok is also called Roan Antelope.

BLAZONRY, the art of delineating figures and devices in their proper colours or metals on armorial shields. The term is also used to express the hatching of the same by the engraver, so as to signify the different colours or metals. See HERALDRY.

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